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(NASA-CR-151161) DESIGN CERTIFICATION
TESTS: HIGH PRESSURE OXYGEN FILTER (HPOF)
PROGRAM. SUMMARY REPORT (TABLES I THROUGH
XLVI) (Wintec Corp., Los Angeles, Calif.)
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SUMMARY REPORT

DESIGN CERTIFICATION TESTS

HIGH PRESSURE OXYGEN FILTER (HPOF) PROGRAM

(Tables I through XLVI)



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TABLE I
DESIGN CERTIFICATION TEST OBJECTIVES

<u>TEST NO.</u>	<u>TEST</u>	<u>OBJECTIVE</u>
1	Flow Rate versus Differential Pressure Test System Tare Values	Establish baseline differential pressure characteristics of the test system without a specimen being installed.
2	Impact Test System Tare Pressure Values	Establish baseline test system performance parameters required to subject specimens to a 703.07 Kg/cm ² (10,000 psia) nominal GN ₂ impact pressure pulse with a rise time of less than 50 milliseconds.
3	Proof Pressure Test	Verify mechanical integrity of HPOF at a proof pressure of 1406 Kg/cm ² (20,000 psia) applied to one side of the specimen.
4	Vibration Test	Verify HPOF is not degraded by the Space Shuttle GFE hardware vibration spectrum as listed in JSC-08708.
5	Clean Condition - Flow Rate versus Differential Pressure	Establish pressure drop characteristics of HPOF over the GN ₂ flow rate range of 0.9 to 5.9 Kg/hr (2 to 13 lbs/hr) under clean conditions at test specimen inlet pressures of 29.177 Kg/cm ² (415 psia), 49.215 Kg/cm ² (700 psia), 70.307 Kg/cm ² (1,000 psia), and 210.92 Kg/cm ² (3,000 psia).
6	Clean Condition - Impact/flow Rate versus Differential Pressure	Establish influence of 100 high pressure (703.07 Kg/cm ² [10,000 psia] nominal) impact cycles on the pressure drop characteristics of HPOF over the flow rate range 0.9 to 5.9 Kg GN ₂ /hr (2 to 13 lbs GN ₂ /hr) at test specimen inlet pressure of 29.177 Kg/cm ² (415 psia) and 70.307 Kg/cm ² (1,000 psia).
7	Contaminant Transmission	Establish size of the largest identifiable particle transmitted by the HPOF under high pressure (703.07 Kg/cm ² [10,000 psia] nominal) GN ₂ impact cycles using a new specimen.
8	Contaminant Transmission	Using the specimen subjected to the vibration test (DCT #4), verify the size of the largest identifiable particle transmitted by the HPOF under high (703.07 Kg/cm ² [10,000 psia] nominal) GN ₂ impact cycles is not significantly altered by the condition of the HPOF after the vibration test.
9	Burst Pressure	Verify HPOF will not burst when a pressure of 2109 Kg/cm ² (30,000 psia) is applied to one side of the specimen.
10	Contaminated Condition - Impact/Flow Rate versus Differential Pressure	Establish contaminant tolerance characteristics of the HPOF through the incremental addition of synthetic contaminant followed by the application of 10 high pressure (703.07 Kg/cm ² [10,000 psia] nominal) GN ₂ impact cycles.

TABLE I (Cont)

<u>TEST NO.</u>	<u>TEST</u>	<u>OBJECTIVE</u>
11	Contaminated Condition - Flow Rate versus Differential Pressure	Establish the contaminant tolerance characteristics of the HPOF through the incremental addition of synthetic contaminant under simple gas flow conditions.
12	Contaminated Condition - Impact/Flow Rate versus Differential Pressure Test Conducted in the Forward and Reverse Flow Directions	Establish contaminant tolerance characteristics of the HPOF through the incremental addition of synthetic contaminant followed by the application of 10 high pressure (703.07 Kg/cm ² [10,000 psia nominal]) GN ₂ impact cycles in the forward and then the reverse flow directions.

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TABLE II
HIGH PRESSURE OXYGEN FILTER PROGRAM
MEASUREMENT LIST

MEASUREMENT NO.	MEASUREMENT DESCRIPTION	RANGE	ACCURACY	METHOD OF RECORDING**
PT-1	HIGH PRESSURE RESERVOIR	0-10,000 PSIA	5%	D, S
PT-2	SYSTEM INLET PRESSURE	0-10,000 PSIA	5%	D, S, F, O
PT-3	TEST SPECIMEN INLET PRESSURE	0-10,000 PSIA	5%	D, S, F, O
PT-3A	TEST SPECIMEN INLET PRESSURE	0-500 PSIA	2%	D, S
PT-3B	TEST SPECIMEN INLET PRESSURE	0-4,000 PSIA	2%	D, S
PT-4	FLOWMETER #1 PRESSURE	0-100 PSIA	2%	D, S
PT-5	FLOWMETER #2 PRESSURE	0-100 PSIA	2%	D, S
PT-6	HIGH RANGE DELTA P (PRIMARY)	0-50 PSID	3%	D, S
PT-7	HIGH RANGE DELTA P (SECONDARY)	0-50 PSID	3%	D, S
PT-8	MID RANGE DELTA P (PRIMARY)	0-5 PSID	3%	D, S
PT-9	MID RANGE DELTA P (SECONDARY)	0-5 PSID	3%	D, S
PT-10	LOW RANGE DELTA P (PRIMARY)	0-1 PSID	3%	D, S
PT-11	LOW RANGE DELTA P (SECONDARY)	0-1 PSID	3%	D, S
PT-12	SPECIMEN INLET PRESSURE (KISTLER)	0-15,000 PSIA		F, O
PT-13	SPECIMEN OUTLET PRESSURE (KISTLER)	0-15,000 PSIA		F, O
PT-14	100 PSID DELTA P	0-100 PSID	3%	D, S
PT-15	250 PSID DELTA P	0-250 PSID	3%	D, S
FM-1	FLOWMETER #1 (PRIMARY)	0.1-1.0 ACFM*	5%	D, S
FM-2	FLOWMETER #2 (SECONDARY)	0.1-1.0 ACFM*	5%	D, S
TT-1	FLOWMETER #1 TEMPERATURE	32-100°F	+3°F	D, S
TT-2	FLOWMETER #2 TEMPERATURE	32-100°F	+3°F	D, S
EV-1	ECV-1 OPEN MICRO-SWITCH POSITION	-----	----	F, O
EV-1A	ECV-1 CLOSED MICRO-SWITCH POSITION	-----	----	F, O
EV-2	ECV-2 OPEN MICRO-SWITCH POSITION	-----	----	F, O
EV-2A	ECV-2 CLOSED MICRO-SWITCH POSITION	-----	----	F, O
EV-3	FIRE SWITCH	-----	----	D

*AT OPERATING PRESSURE OF 50 PSIA

** D=DIGITAL

F=FM

S=STRIP CHART

O=OSCILLOGRAPH

TABLE III
HPOF Specimens Used for the Design Certification Tests

<u>Test No.</u>	<u>Design Certification Test</u>	<u>HPOF Specimen Serial No.</u>
1	Flow Rate Versus Differential Pressure Test System Tare Values	None
2	Impact Test System Tare Pressure Values	None
3	Proof Pressure Test	029
4	Vibration Test	025
5	Clean Condition - Flow Rate Versus Differential Pressure	021, 022, 023, 025, 027, 028
6	Clean Condition - Impact/Flow Rate Versus Differential Pressure	021
7	Contaminant Transmission	023
8	Contaminant Transmission	025
9	Burst Pressure Test	029
10	Contaminated Condition - Impact/Flow Rate Versus Differential Pressure	027
11	Contaminated Condition - Flow Rate Versus Differential Pressure	022
12	Contaminated Condition - Impact Flow Rate Versus Differential Pressure Test Conducted in the Forward and Reverse Flow Directions	028

TABLE IV
 DCT No. 1 Flow Rate versus Differential Pressure Test System Tare Values.
 Equations Relating "Tare" Differential Pressure as a Function of Actual GN_2
 Flow Rate

Nominal Test Specimen Inlet Pressure (Kg/cm^2)		<u>Equation</u>	<u>Sigma</u>
29.177	415	"Tare" Differential Pressure (PSID) = $-0.00034 - 0.000444 (\text{ACFM}) + 0.150933$ $(\text{ACFM})^2$	0.00034
49.215	700	"Tare" Differential Pressure (PSID) = $0.000360 - 0.033161 (\text{ACFM}) + 0.633359$ $(\text{ACFM})^2$	0.00018
70.307	1000	"Tare" Differential Pressure (PSID) = $-0.000164 + 0.012693 (\text{ACFM}) - 0.248070$ $(\text{ACFM})^2$	0.00033
210.92	3000	"Tare" Differential Pressure (PSID) = $-0.001246 + 0.488453 (\text{ACFM}) - 40.072254$ $(\text{ACFM})^2$	0.00070

TABLE V
TEST NO. 2
IMPACT TEST SYSTEM "TONE" HIGH PRESSURE GN2 IMPACT VALVES
(Obtained using a prototype HPOF)

IMPACT CYCLE NO.	PRESSURE UPSTREAM OF ISOLATION VALVE		PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN		RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE
	(PSIA)	(Kg/cm ²)	(PSIA)	(Kg/cm ²)	
1	10,020	704.5	9,931	698.2	0.991
2	10,180	715.7	9,738	684.6	0.957
3	10,040	705.9	9,689	681.2	0.965
4	10,030	705.2	9,667	679.7	0.964
5	10,030	705.2	9,751	685.6	0.972
6	10,040	705.9	10,000	703.1	0.996
7	10,200	717.1	9,500	667.9	0.931
8	10,090	709.4	9,500	667.9	0.941
9	10,080	708.7	9,250	650.3	0.918
10	<u>10,080</u>	<u>708.7</u>	<u>9,250</u>	<u>650.3</u>	<u>0.918</u>
Avg	10,079	708.6	9,628	676.9	0.955

TABLE VI
Test Specimen S/N 029

Bubble Point and Cleanliness Verification Data Obtained as part of the Proof/Burst Pressure DCT.

	NVR (mg/100ml)	Cleanliness Verification			
		< 5	5-15	16-25	>25
SN-C-0005* Level 25A Requirements	1	Unlimited**	19	4	0
S/N Side of Specimen	0.1	No silting	8	4	0
Unserialized Side of Specimen	0.1	No silting	10	2	0

* Specification, Contamination Control Requirements for the Space Shuttle Program

** No silting

Standard Bubble Point Data

Before DCT 183.7 cm (72.31 inches) of water pressure
After DCT 170.7 cm (67.20 inches) of water pressure

TABLE VII
Test Specimen S/N 025

Bubble Point and Cleanliness Verification Test Data Obtained Before and After the Vibration DCT

	NVR (mg/100ml)	Cleanliness Verification			
		≤ 5	5-15	16-25	> 25
SN-C-005* Level 25A Requirement	1	Unlimited**	19	4	0
<u>Data Obtained Before Vibration DCT</u>					
S/N Side of Specimen	0.6	No silting	4	0	0
Unserialized Side of Specimen	0.6	No silting	4	3	0
<u>Data Obtained After Vibration DCT</u>					
S/N side of Specimen	0.3	No silting	1	0	0
Unserialized Side of Specimen	0.3	No silting	0	0	0

* Specification, Contamination Control Requirements for the Space Shuttle Program

** No silting allowed

Standard Bubble Point Data

Obtained before Vibration DCT 180.2 cm (70.96 inches) of water pressure

Obtained after Vibraiton DCT 150.4 cm (59.23 inches) of water pressure

TABLE VIII Part A
 TEST NO. 5
 TEST SPECIMEN S/N 022

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE	(Kg/cm ²)
		29.419 ^A	50.539 ^B
0.5	2.018	0.605	0.441
1.0	2.391	1.335	0.973
1.5	3.877	2.112	1.540
2.0	5.595	2.943	2.143
2.5	7.490	3.831	2.779
3.0	9.680	4.777	3.449
3.5	12.357	5.785	4.152
4.0	15.782	6.856	4.889
4.5	20.305	7.991	5.658
5.0	26.409	9.191	6.461
5.5	-----	10.458	7.297
6.0	-----	11.793	8.166

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} + 0.378595 + 1.049877 (\text{log Kg GN}_2/\text{hr}) + 1.305730 (\text{log Kg GN}_2/\text{hr})^2$
 $- 3.468062 (\text{log Kg GN}_2/\text{hr})^3 + 3.584980 (\text{log Kg GN}_2/\text{hr})^4.$
Sigma = 0.162

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.125441 + 1.127440 (\text{log Kg GN}_2/\text{hr}) - 0.000549 (\text{log Kg GN}_2/\text{hr})^2$
 $+ 0.146884 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.016

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.011987 + 1.130903 (\text{log Kg GN}_2/\text{hr}) - 1.000892 (\text{log Kg GN}_2/\text{hr})^2$
 $+ 0.094496 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.011

TABLE VIII Part B
TEST NO. 5
TEST SPECIMEN S/N 022

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.419 ^A	50.539 ^B	71.311 ^C
10	1.884	0.937	0.682
15	2.585	1.455	1.061
20	3.627	1.999	1.458
25	4.794	2.570	1.871
30	6.036	3.168	2.299
35	7.365	3.792	2.744
40	8.820	4.443	3.203
45	10.459	5.121	3.676
50	12.352	5.825	4.164
55	14.586	6.557	4.666
60	17.263	7.315	5.181
65	20.511	8.099	5.710
70	24.490	8.910	6.252
75	-----	9.748	6.807
80	-----	10.612	7.375
85	-----	11.503	7.956
90	-----	12.421	8.550
95	-----	13.365	9.156
100	-----	14.336	9.775

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\begin{aligned}\text{Log (Kg/cm}^2 \text{ differential)} = & a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 \\ & + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4\end{aligned}$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 12.175415 - 36.489302 (\text{log liters GN}_2/\text{min})$
 $+ 40.364420 (\text{log liters GN}_2/\text{min})^2 - 19.207023 (\text{log liters GN}_2/\text{min})^3 + 3.431566$
 $\text{Sigma} = 0.150$
 $\text{log liters GN}_2/\text{min})^4$

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.166147 + 1.280645 (\text{log liters GN}_2/\text{min}) - 0.225500$
 $(\text{log liters GN}_2/\text{min})^2 + 0.082912 (\text{log liters GN}_2/\text{min})^3$
 $\text{Sigma} = 0.022$

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.280171 + 1.194644 (\text{log liters GN}_2/\text{min})$
 $- 0.131295 (\text{log liters GN}_2/\text{min})^2 + 0.050771 (\text{log liters GN}_2/\text{min})^3$
 $\text{Sigma} = 0.012$

TABLE VIII Part C
 TEST NO. 5
 TEST SPECIMEN S/N 022
 CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	418.4 ^A	718.8 ^B	1014.3 ^C
1.0	32.516	7.673	5.607
1.5	25.751	12.274	8.942
2.0	30.879	17.006	12.394
2.5	39.113	21.875	15.952
3.0	48.789	26.889	19.614
3.5	59.258	32.054	23.377
4.0	70.245	37.378	27.240
4.5	81.683	42.865	31.203
5.0	93.629	48.520	35.266
5.5	106.223	54.345	39.427
6.0	119.660	60.343	43.687
6.5	134.174	66.518	48.044
7.0	150.040	72.871	52.500
7.5	167.565	79.404	57.054
8.0	187.099	86.121	61.705
8.5	209.039	93.022	66.454
9.0	233.840	100.109	71.299
9.5	262.029	107.385	76.242
10.0	294.213	114.850	81.282
10.5	331.105	122.508	86.419
11.0	373.538	130.359	91.653
11.5	-----	138.405	96.983
12.0	-----	146.648	102.410
12.5	-----	155.090	107.935
13.0	-----	163.731	113.556
13.5	-----	172.575	119.274
14.0	-----	181.623	125.088
14.5	-----	190.875	131.000
15.0	-----	200.335	137.009

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.512097 - 1.633292 (\log \text{lbs GN}_2/\text{hr}) + 7.367765 (\log \text{lbs GN}_2/\text{hr})^2$
 $- 8.348530 (\log \text{lbs GN}_2/\text{hr})^3 + 3.570622 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma + 2.316

B. $\text{Log (PSID)} = 0.884977 + 1.180898 (\log \text{lbs GN}_2/\text{hr}) - 0.153052 (\log \text{lbs GN}_2/\text{hr})^2$
 $+ 0.147309 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.222

C. $\text{Log (PSID)} = 0.748709 + 1.165743 (\log \text{lbs GN}_2/\text{hr}) - 0.099645 (\log \text{lbs GN}_2/\text{hr})^2$
 $+ 0.095188 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.159

TABLE VIII Part D
 TEST NO. 5
 TEST SPECIMEN S/N 022
 CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	418.4 ^A	718.8 ^B	1014.3 ^C
0.4	27.616	14.502	10.570
0.5	33.454	18.653	13.603
0.6	41.032	22.911	16.715
0.7	49.559	27.281	19.905
0.8	58.660	31.767	23.172
0.9	68.157	36.372	26.515
1.0	77.991	41.100	29.933
1.1	88.184	45.954	33.426
1.2	98.809	50.936	36.995
1.3	109.976	56.047	40.637
1.4	121.825	61.290	44.355
1.5	134.516	66.666	48.146
1.6	148.229	72.176	52.011
1.7	163.168	77.821	55.949
1.8	179.556	83.604	59.962
1.9	197.644	89.525	64.047
2.0	217.716	95.585	68.206
2.1	240.090	101.786	72.438
2.2	265.127	108.129	76.743
2.3	293.238	114.614	81.121
2.4	324.896	121.243	85.572
2.5	360.641	128.017	90.096
2.6	401.099	134.936	94.693
2.7	-----	142.003	99.362
2.8	-----	149.218	104.105
2.9	-----	156.582	108.920
3.0	-----	164.096	113.807
3.1	-----	171.761	118.768
3.2	-----	179.579	123.801
3.3	-----	187.549	128.907
3.4	-----	195.675	134.086
3.5	-----	203.955	139.338

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3 + e (\log \text{SCFM})^4$$

A. $\text{Log (PSID)} = 1.892045 + 1.282832 (\log \text{SCFM}) + 0.104842 (\log \text{SCFM})^2 + 0.753312 (\log \text{SCFM})^3 + 3.607614 (\log \text{SCFM})^4$
Sigma = 2.309

B. $\text{Log (PSID)} = 1.613847 + 1.165621 (\log \text{SCFM}) + 0.129417 (\log \text{SCFM})^2 + 0.144064 (\log \text{SCFM})^3$
Sigma = 0.224

C. $\text{Log (PSID)} = 1.476150 + 1.154553 (\log \text{SCFM}) + 0.083575 (\log \text{SCFM})^2 + 0.093297 (\log \text{SCFM})^3$
Sigma = 0.158

TABLE IX
Test Specimen S/N 022

Bubble Point and Cleanliness Verification Test Data Obtained before and after the Clean Condition - Pressure Drop DCT

	NVR (mg/100ml)	Cleanliness Verification			
		<5	5-15	16-25	>25
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0
<u>Data before Clean Condition - Pressure Drop Test</u>					
S/N side of Specimen	0.2	No silting	5	3	0
Unserialized Side of Specimen	0.2	No silting	4	2	0
<u>Data after Clean Condition - Pressure Drop Test</u>					
S/N side of specimen	<0.1	No silting	1	0	0
Unserialized Side of Specimen	<0.1	No silting	0	0	0

* Specification Contamination Control Requirements for the Space Shuttle Program.

** No silting allowed

Standard Bubble Point Data

Before Clean Condition - Pressure Drop DCT 152.5 cm (60.06 inches) of water pressure.

After Clean Condition - Pressure Drop DCT 146.7 cm (57.76 inches) of water pressure

TABLE X
Test Specimen S/N 023

Bubble Point and Cleanliness Verification Test Data Obtained Prior to the Clean Condition - Pressure Drop DCT

	NVR (mg/100ml)	Cleanliness Verification			
		<u>< 5</u>	<u>5-15</u>	<u>16-25</u>	<u>>25</u>
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0
S/N Side of Specimen	0.4	No silting	2	0	0
Unserialized Side of Specimen	0.4	No silting	0	0	0

* Specification, Contamination Control Requirements for the Space Shuttle Program

** No silting allowed

Standard Bubble Point

173.5 cm (68.29 inches) of water pressure

TABLE XI Part A
TEST NO. 5
TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (Kg. GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	29.386 ^A	50.097 ^B	70.865 ^C
0.5	2.126	0.618	0.437	
1.0	2.315	1.265	0.914	
1.5	3.741	1.982	1.435	
2.0	5.382	2.761	1.992	
2.5	7.169	3.597	2.582	
3.0	9.223	4.488	3.202	
3.5	11.744	5.428	3.850	
4.0	15.001	6.418	4.522	
4.5	19.361	7.453	5.219	
5.0	25.339	8.534	5.939	
5.5	-----	9.657	6.681	
6.0	-----	10.823	7.444	

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.364607 + 1.028845 (\text{log Kg GN}_2/\text{hr}) + 1.451526 (\text{log Kg GN}_2/\text{hr})^2 - 3.961803 (\text{log Kg GN}_2/\text{hr})^3 + 4.037911 (\text{log Kg GN}_2/\text{hr})^4$
Sigma = 0.148

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.102142 + 1.080291 (\text{log Kg GN}_2/\text{hr}) + 0.151262 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.083

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.039047 + 1.094718 (\text{log Kg GN}_2/\text{hr}) + 0.097467 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.030

TABLE XI Part B
TEST NO. 5
TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.386 ^A	50.097 ^B	70.865 ^C
10	1.808	0.864	0.617
15	2.420	1.325	0.956
20	3.401	1.820	1.317
25	4.506	2.346	1.695
30	5.677	2.900	2.091
35	6.922	3.482	2.502
40	8.284	4.090	2.927
45	9.824	4.724	3.366
50	11.619	5.382	3.819
55	13.761	6.063	4.283
60	16.363	6.767	4.760
65	19.571	7.494	5.248
70	23.565	8.242	5.747
75	28.583	9.012	6.256
80	-----	9.803	6.777
85	-----	10.614	7.307
90	-----	11.445	7.847
95	-----	12.296	8.397
100	-----	13.167	8.956

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 14.526827 - 43.312338 (\text{log liters GN}_2/\text{min}) + 47.639599 (\text{log liters GN}_2/\text{min})^2 - 22.626927 (\text{log liters GN}_2/\text{min})^3 + 4.029968 (\text{log liters GN}_2/\text{min})^4$
Sigma = 0.156

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.938578 + 0.720871 (\text{log liters GN}_2/\text{min}) + 0.154082 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.082

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.177866 + 0.870999 (\text{log liters GN}_2/\text{min}) + 0.096995 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.029

TABLE XI Part C
 TEST NO. 5
 TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)		
	418.0 ^A	712.5 ^B	1007.9 ^C
1.0	-----	7.977	5.618
1.5	25.586	11.983	8.582
2.0	29.993	16.204	11.690
2.5	37.803	20.631	14.929
3.0	47.106	25.254	18.288
3.5	57.173	30.065	21.759
4.0	67.688	35.055	25.335
4.5	78.566	40.218	29.010
5.0	89.860	45.547	32.780
5.5	101.711	51.038	36.640
6.0	114.321	56.686	40.587
6.5	127.934	62.486	44.618
7.0	142.831	68.436	48.729
7.5	159.332	74.531	52.918
8.0	177.800	80.769	57.183
8.5	198.647	87.147	61.521
9.0	222.350	93.662	65.931
9.5	249.463	100.312	70.412
10.0	280.634	107.095	74.961
10.5	316.626	114.008	79.576
11.0	358.342	121.050	84.257
11.5	406.856	128.219	89.002
12.0	-----	135.513	93.811
12.5	-----	142.931	98.680
13.0	-----	150.471	103.611
13.5	-----	158.132	108.601
14.0	-----	165.912	113.650
14.5	-----	173.811	118.757
15.0	-----	181.826	123.921

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.552762 - 2.028642 (\log \text{lbs GN}_2/\text{hr}) + 8.403450 (\log \text{lbs GN}_2/\text{hr})^2 - 9.522875 (\log \text{lbs GN}_2/\text{hr})^3 + 4.043446 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 2.089

B. $\text{Log (PSID)} = 0.901863 + 0.976896 (\log \text{lbs GN}_2/\text{hr}) + 0.151009 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 1.173

C. $\text{Log (PSID)} = 0.749577 + 1.027894 (\log \text{lbs GN}_2/\text{hr}) + 0.097362 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.424

TABLE XI Part D
TEST NO. 5
TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	<u>418.0^A</u>	<u>712.5^B</u>	<u>1007.9^C</u>
0.4	-----	13.958	10.035
0.5	32.416	17.695	12.781
0.6	39.663	21.586	15.623
0.7	47.862	25.623	18.554
0.8	56.601	29.801	21.569
0.9	65.684	34.114	24.663
1.0	75.044	38.558	27.833
1.1	84.699	43.130	31.075
1.2	94.722	47.824	34.386
1.3	105.229	52.639	37.764
1.4	116.359	57.572	41.207
1.5	128.278	62.619	44.712
1.6	141.171	67.779	48.278
1.7	155.244	73.048	51.903
1.8	170.727	78.426	55.585
1.9	187.879	83.910	59.323
2.0	206.989	89.499	63.116
2.1	228.387	95.190	66.963
2.2	252.448	100.983	70.861
2.3	279.605	106.876	74.812
2.4	310.353	112.867	78.812
2.5	345.268	118.956	82.862
2.6	385.017	125.141	86.961
2.7	-----	131.421	91.107
2.8	-----	137.795	95.300
2.9	-----	144.262	99.539
3.0	-----	150.820	103.824
3.1	-----	157.470	108.154
3.2	-----	164.211	112.528
3.3	-----	171.040	116.945
3.4	-----	177.959	121.406
3.5	-----	184.965	125.909

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3 + e (\log \text{SCFM})^4$$

A. $\text{Log (PSID)} = 1.875316 + 1.265789 (\log \text{SCFM}) + 0.057545 (\log \text{SCFM})^2 + 0.790129 (\log \text{SCFM})^3 + 3.996893 (\log \text{SCFM})^4$
Sigma = 2.101

B. $\text{Log (PSID)} = 1.586118 + 1.169244 (\log \text{SCFM}) + 0.151425 (\log \text{SCFM})^2$
Sigma = 1.168

C. $\text{Log (PSID)} = 1.444556 + 1.152007 (\log \text{SCFM}) + 0.097059 (\log \text{SCFM})^2$
Sigma = 0.425

TABLE XII
Test Specimen S/N 025

Bubble Point and Cleanliness Verification Test Data Obtained Prior to the Clean Condition - Flow Rate versus Differential Pressure DCT

	NVR (mg/100ml)	Cleanliness Verification			
		<u>< 5</u>	<u>5-15</u>	<u>16-25</u>	<u>> 25</u>
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0
S/N side of Specimen	0.6	No silting	4	0	0
Unserialized Side of Specimen	0.6	No silting	4	3	0

* Specification, Contamination Control Requirements for the Space Shuttle Program

** No silting allowed

Standard Bubble Point

180.2 cm (70.96 inches) of water pressure

TABLE XIII
Test Specimen S/N 027

Bubble Point and Cleanliness Verification Test Data Obtained Prior to the Clean Condition - Flow Rate versus Differential Pressure DCT.

	NVR (mg/100ml)	Cleanliness Verification			
		<u>< 5</u>	<u>5-15</u>	<u>16-25</u>	<u>> 25</u>
SN-C-0005* Level 25A Requirements	1	Unlimited **	19	4	0
S/N Side of Specimen	0.4	No silting	2	0	0
Unserialized Side of Specimen	0.4	No silting	0	0	0

*Specification, Contamination Control Requirements for the Space Shuttle Program

** No silting allowed

Standard Bubble Point

165.4 cm (65.13 inches) of water pressure

TABLE XIV
Test Specimen S/N 028

Bubble Point and Cleanliness Verification Test Data Obtained Prior to the Clean Condition Flow Rate versus Differential Pressure DCT.

	NVR (mg/100ml)	Cleanliness Verification			
		< 5	5-15	16-25	>25
SN-C-0005* Level 25A Requirements	1	Unlimited *	19	4	0
S/N Side of Specimen	< 0.1	No silting	0	0	0
Unserialized Side of Specimen	< 0.1	No silting	0	0	0

* Specification, Contamination Control Requirements for the Spate Shuttle Program

** No silting allowed.

Standard Bubble Point

163.0 cm (64.17 inches) of water pressure

TABLE XV Part A
TEST NO. 6
TEST SPECIMEN S/N 021

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA PRIOR TO GN₂ IMPACT CYCLES

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
		29.147A	49.876B
0.5	1.337	0.487	0.372
1.0	2.001	1.131	0.856
1.5	3.332	1.832	1.382
2.0	4.865	2.591	1.946
2.5	6.582	3.411	2.547
3.0	8.584	4.294	3.187
3.5	11.029	5.242	3.864
4.0	14.128	6.258	4.579
4.5	18.156	7.342	5.332
5.0	23.490	8.497	6.124
5.5	-----	9.725	6.954
6.0	-----	11.028	7.823

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.301218 + 1.162248 (\text{log Kg GN}_2/\text{hr}) + 0.903440 (\text{log Kg GN}_2/\text{hr})^2 - 2.545782 (\text{log Kg GN}_2/\text{hr})^3 + 2.870903 (\text{log Kg GN}_2/\text{hr})^4$
Sigma = 0.148

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.053496 + 1.189931 (\text{log Kg GN}_2/\text{hr}) - 0.032807 (\text{log Kg GN}_2/\text{hr})^2 + 0.175984 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.025

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.067427 + 1.182118 (\text{log Kg GN}_2/\text{hr}) - 0.030370 (\text{log Kg GN}_2/\text{hr})^2 + 0.125940 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.018

TABLE XV Part B
 TEST NO. 6
 TEST SPECIMEN S/N 021
 CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA PRIOR TO GN_2 IMPACT CYCLES

FLOW RATE (liters* GN_2/min)	<u>NET DIFFERENTIAL PRESSURE (Kg/cm² Differential)</u>		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
10	29.147 ^A	49.876 ^B	70.768 ^C
15	1.474	0.753	0.581
20	2.145	1.211	0.924
25	3.059	1.694	1.284
30	4.082	2.202	1.661
35	5.186	2.736	2.055
40	6.379	3.297	2.465
45	7.691	3.885	2.892
50	9.166	4.501	3.334
55	10.857	5.145	3.793
60	12.826	5.817	4.268
65	15.149	6.518	4.759
70	17.919	7.249	5.266
75	21.246	8.010	5.788
80	25.268	8.800	6.327
85	-----	9.622	6.882
90	-----	10.474	7.452
95	-----	11.357	8.038
100	-----	12.272	8.641
	-----	13.220	9.259

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 9.137797 - 28.240358 (\text{log liters GN}_2/\text{min}) + 31.710348 (\text{log liters GN}_2/\text{min})^2 - 15.166783 (\text{log liters GN}_2/\text{min})^3 + 2.727426 (\text{log liters GN}_2/\text{min})^4$
Sigma = 0.160

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.546486 + 1.815722 (\text{log liters GN}_2/\text{min}) - 0.543766 (\text{log liters GN}_2/\text{min})^2 + 0.151416 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.032

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.518648 + 1.514168 (\text{log liters GN}_2/\text{min}) - 0.326680 (\text{log liters GN}_2/\text{min})^2 + 0.095450 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.020

TABLE XV Part C
 TEST NO. 6
 TEST SPECIMEN S/N 021

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA PRIOR TO GN₂ IMPACT CYCLES

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	414.6 ^A	709.4 ^B	1006.6 ^C
1.0	20.019	6.113	4.703.
1.5	19.891	10.125	7.707
2.0	25.519	14.318	10.854
2.5	33.119	18.677	14.125
3.0	41.761	23.199	17.513
3.5	51.051	27.889	21.015
4.0	60.833	32.750	24.629
4.5	71.087	37.785	28.354
5.0	81.878	42.999	32.190
5.5	93.330	48.394	36.137
6.0	105.603	53.974	40.194
6.5	118.892	59.741	44.361
7.0	133.415	65.698	48.639
7.5	149.423	71.847	53.027
8.0	167.198	78.193	57.526
8.5	187.056	84.736	62.135
9.0	209.358	91.479	66.856
9.5	234.519	98.426	71.688
10.0	263.011	105.577	76.631
10.5	295.381	112.937	81.686
11.0	332.260	120.507	86.853
11.5	374.383	128,289	92.133
12.0	-----	136.286	97.525
12.5	-----	144.501	103.030
13.0	-----	152.936	108.649
13.5	-----	161.593	114.382
14.0	-----	170.475	120.229
14.5	-----	179.584	126.190
15.0	-----	188.923	132.267

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.301439 - 0.800447 (\log \text{lbs GN}_2/\text{hr}) + 5.500113 (\log \text{lbs GN}_2/\text{hr})^2 - 6.431357 (\log \text{lbs GN}_2/\text{hr})^3 + 2.850226 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 2.124

B. $\text{Log (PSID)} = 0.786281 + 1.276945 (\log \text{lbs GN}_2/\text{hr}) - 0.216407 (\log \text{lbs GN}_2/\text{hr})^2 + 0.176752 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.351

C. $\text{Log (PSID)} = 0.672416 + 1.240455 (\log \text{lbs GN}_2/\text{hr}) - 0.149673 (\log \text{lbs GN}_2/\text{hr})^2 + 0.121206 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.257

PART XV Part D
 TEST NO. 6
 TEST SPECIMEN S/N 021

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA PRIOR TO GN₂ IMPACT CYCLES

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	414.6 ^A	709.4 ^B	1006.6 ^C
0.4	22.223	12.097	9.188
0.5	27.938	15.794	11.959
0.6	34.831	19.614	14.822
0.7	42.434	23.559	17.774
0.8	50.515	27.630	20.813
0.9	58.969	31.830	23.937
1.0	67.774	36.162	27.147
1.1	76.960	40.627	30.440
1.2	86.593	45.227	33.818
1.3	96.767	49.966	37.279
1.4	106.597	54.845	40.823
1.5	119.213	59.865	44.451
1.6	131.762	65.029	48.163
1.7	145.406	70.338	51.957
1.8	160.328	75.794	55.835
1.9	176.729	81.399	59.796
2.0	194.834	87.155	63.841
2.1	214.894	93.062	67.968
2.2	237.193	99.122	72.180
2.3	262.052	105.338	76.475
2.4	289.833	111.711	80.853
2.5	320.948	118.242	85.316
2.6	355.865	124.932	89.862
2.7	395.119	131.785	94.493
2.8	-----	138.800	99.208
2.9	-----	145.980	104.008
3.0	-----	153.327	108.892
3.1	-----	160.841	113.861
3.2	-----	168.525	118.916
3.3	-----	176.380	124.055
3.4	-----	184.407	129.281
3.5	-----	192.610	134.592

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.831064 + 1.325957 (\text{log SCFM}) + 0.143810 (\text{log SCFM})^2 + 0.827791 (\text{log SCFM})^3 + 2.902377 (\text{log SCFM})^4$
Sigma = 2.113

B. $\text{Log (PSID)} = 1.558247 + 1.216145 (\text{log SCFM}) + 0.122942 (\text{log SCFM})^2 + 0.176176 (\text{log SCFM})^3$
Sigma = 0.345

C. $\text{Log (PSID)} = 1.433715 + 1.197757 (\text{log SCFM}) + 0.084690 (\text{log SCFM})^2 + 0.115326 (\text{log SCFM})^3$
Sigma = 0.256

TABLE XVI
Test Specimen S/N 021

Bubble Point and Cleanliness Verification Test Data Obtained Before DCT #5 and Bubble Point Data Obtained at the Completion of DCT #6

	NVR (mg/100ml)	Cleanliness Verification			
		≤ 5	5-15	16-25	> 25
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0
<u>Data Obtained Before DCT #5</u>					
S/N Side of Specimen	0.4	No silting	1	0	0
Unserialized Side of HPOF	0.4	No silting	1	0	0

* Specification, Contamination Control Requirements for Space Shuttle Program

** No silting allowed

Standard Bubble Point

Before DCT #5, 141.9 cm (55.87 inches) of water pressure
After DCT #6, 117.0 cm (46.08 inches) of water pressure

TABLE XVII
TEST NO. 6
TYPICAL GN₂ IMPACT DATA

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u> (PSIA)	<u>(Kg/cm²)</u>	<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u> (PSIA)	<u>(Kg/cm²)</u>	<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
1	10,440	734.0	9,458	665.0	0.906
5	10,500	738.2	9,458	665.0	0.901
10	10,540	741.0	9,425	662.6	0.894
15	10,500	738.2	9,442	663.8	0.899
20	10,360	728.4	9,301	653.9	0.898
25	10,540	741.0	9,491	667.3	0.900
30	10,560	742.4	9,632	677.2	0.912
35	10,590	744.5	9,577	673.3	0.904
40	10,470	736.1	9,480	666.5	0.905
45	10,490	737.5	8,554	601.4	0.815
50	10,730	754.4	9,460	665.1	0.882
55	10,510	738.9	9,217	648.0	0.877
60	10,530	740.3	9,137	642.4	0.868
65	10,540	741.0	9,164	644.3	0.869
70	10,480	736.8	9,212	647.7	0.879
75	10,510	738.9	9,241	649.7	0.879
80	10,520	739.6	9,273	651.9	0.881
85	10,680	750.9	9,599	674.9	0.899
90	10,550	741.7	9,534	670.3	0.903
95	10,520	739.6	9,371	658.8	0.891
100	10,540	741.0	9,490	667.2	0.900

TABLE XVIII Part A
 TEST NO. 5
 TEST SPECIMEN S/N 021
 CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 FLOW RATE VERSUS DIFFERENTIAL PRESSURE AFTER 100
 [703.07 Kg/cm² NOMINAL] GN₂ IMPACT CYCLES

<u>(Kg GN₂/hr)</u>	<u>NET DIFFERENTIAL PRESSURE (Kg/cm² Differential)</u>		
	<u>TEST SPECIMEN</u>	<u>INLET PRESSURE (Kg/cm²)</u>	
	<u>29.504^A</u>	<u>50.235^B</u>	<u>71.423^C</u>
0.5	0.403	0.223	0.176
1.0	0.937	0.499	0.388
1.5	1.531	0.812	0.627
2.0	2.189	1.155	0.889
2.5	2.915	1.524	1.170
3.0	3.714	1.917	1.468
3.5	4.589	2.332	1.783
4.0	5.544	2.767	2.113
4.5	6.583	3.221	2.457
5.0	7.707	3.694	2.815
5.5	8.922	4.183	3.185
6.0	10.231	4.689	3.568

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.028075 + 1.201939 (\log \text{Kg GN}_2/\text{hr}) + 0.008772 (\log \text{Kg GN}_2/\text{hr})^2 + 0.206678 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.034

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.301694 + 1.184817 (\log \text{Kg GN}_2/\text{hr}) + 0.083884 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.015

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.410913 + 1.168038 (\log \text{Kg GN}_2/\text{hr}) + 0.089866 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.006

TABLE XVIII Part B
 TEST NO. 5
 TEST SPECIMEN S/N 021
 CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA AFTER 100
 [703.07 Kg/cm² NOMINAL] GN₂ IMPACT CYCLES

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.504 ^A	50.235 ^B	71.423 ^C
10	0.640	0.344	0.260
15	1.018	0.547	0.414
20	1.425	0.766	0.580
25	1.862	0.999	0.756
30	2.331	1.245	0.940
35	2.831	1.502	1.133
40	3.364	1.771	1.333
45	3.931	2.049	1.540
50	4.531	2.337	1.754
55	5.165	2.635	1.974
60	5.834	2.941	2.200
65	6.540	3.256	2.432
70	7.281	3.579	2.669
75	8.059	3.910	2.911
80	8.875	4.249	3.159
85	9.729	4.595	3.411
90	10.621	4.948	3.668
95	11.553	5.309	3.930
100	12.525	5.677	4.196

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.457866 + 1.529421 (\text{log liters GN}_2/\text{min}) - 0.405005 (\text{log liters GN}_2/\text{min})^2 + 0.139604 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.030

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.499668 + 0.946370 (\text{log liters GN}_2/\text{min}) + 0.090255 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.018

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.648694 + 0.991528 (\text{log liters GN}_2/\text{min}) + 0.072928 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.009

TABLE XVIII Part C
 TEST NO. 5
 TEST SPECIMEN S/N 021
 CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA AFTER 100
 [10,000 PSIA NOMINAL] GN₂ IMPACT CYCLES

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	419.6 ^A	714.5 ^B	1015.9 ^C
1.0	5.066	2.846	2.248
1.5	8.377	4.522	3.542
2.0	11.859	6.327	4.930
2.5	15.509	8.245	6.399
3.0	19.336	10.262	7.942
3.5	23.345	12.373	9.553
4.0	27.545	14.569	11.227
4.5	31.941	16.845	12.960
5.0	36.539	19.198	14.750
5.5	41.344	21.623	16.594
6.0	46.362	24.117	18.489
6.5	51.597	26.678	20.434
7.0	57.054	29.302	22.426
7.5	62.739	31.989	24.465
8.0	68.655	34.736	26.548
8.5	74.807	37.541	28.675
9.0	81.201	40.403	30.844
9.5	87.839	43.320	33.055
10.0	94.727	46.290	35.306
10.5	101.870	49.314	37.596
11.0	109.272	52.389	39.925
11.5	116.938	55.514	42.292
12.0	124.872	58.689	44.696
12.5	133.079	61.912	47.136
13.0	141.564	65.183	49.612
13.5	150.331	68.500	52.123
14.0	159.386	71.864	54.669
14.5	168.733	75.273	57.249
15.0	178.377	78.726	59.863

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 0.704640 + 1.270367 (\log \text{lbs GN}_2/\text{hr}) - 0.206283 (\log \text{lbs GN}_2/\text{hr})^2 + 0.207751 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.478

B. $\text{Log (PSID)} = 0.454185 + 1.27636 (\log \text{lbs GN}_2/\text{hr}) + 0.083670 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.216

C. $\text{Log (PSID)} = 0.351782 + 1.105770 (\log \text{lbs GN}_2/\text{hr}) + 0.090291 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.084

TABLE XVIII Part D

TEST NO. 5

TEST SPECIMEN S/N 021

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA AFTER 100
 [10,000 PSIA NOMINAL] GN₂ IMPACT CYCLES

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	419.6 ^A	714.5 ^B	1015.9 ^C
0.4	9.994	5.359	4.183
0.5	13.081	6.968	5.419
0.6	16.296	8.658	6.713
0.7	19.643	10.423	8.062
0.8	23.128	12.257	9.462
0.9	26.754	14.155	10.910
1.0	30.527	16.115	12.403
1.1	34.450	18.133	13.939
1.2	38.528	20.207	15.517
1.3	42.763	22.334	17.134
1.4	47.158	24.513	18.789
1.5	51.719	26.742	20.482
1.6	56.447	29.018	22.210
1.7	61.345	31.342	23.973
1.8	66.418	33.711	25.770
1.9	71.667	36.124	27.600
2.0	77.097	38.580	29.462
2.1	82.710	41.079	31.356
2.2	88.509	43.619	33.280
2.3	94.497	46.199	35.235
2.4	100.677	48.818	37.219
2.5	107.054	51.477	39.232
2.6	113.628	54.173	41.274
2.7	120.405	56.907	43.344
2.8	127.386	59.678	45.441
2.9	134.575	62.485	47.566
3.0	141.975	65.328	49.717
3.1	149.590	68.206	51.895
3.2	157.423	71.118	54.098
3.3	165.476	74.065	56.328
3.4	173.753	77.045	58.582
3.5	182.258	80.058	60.862

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.484688 + 1.260296 (\text{log SCFM}) + 0.189342 (\text{log SCFM})^2 + 0.212759 (\text{log SCFM})^3$
Sigma = 0.484

B. $\text{Log (PSID)} = 1.207233 + 1.234530 (\text{log SCFM}) + 0.082784 (\text{log SCFM})^2$
Sigma = 0.218

C. $\text{Log (PSID)} = 1.093530 + 1.221429 (\text{log SCFM}) + 0.088763 (\text{log SCFM})^2$
Sigma = 0.084

TABLE XIX
TEST NO. 7
TEST SPECIMEN S/N 023
TYPICAL GN_2 IMPACT PRESSURE DATA ACQUIRED
DURING CONTAMINANT TRANSMISSION PORTION OF TEST

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u>		<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u>		<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
	<u>(PSIA)</u>	<u>(Kg/cm²)</u>	<u>(PSIA)</u>	<u>(Kg/cm²)</u>	
1	10,130	712.2	9,325	655.6	0.920
5	10,180	715.7	9,396	660.6	0.923
10	10,220	718.5	9,464	665.4	0.926
15	10,050	706.6	9,372	658.9	0.932
20	10,470	736.1	9,674	680.1	0.924
25	10,370	729.1	9,744	685.1	0.940
30	10,360	728.4	9,721	683.4	0.938
35	10,370	729.1	9,814	690.0	0.946
40	10,430	733.3	9,849	692.4	0.944
45	10,440	734.0	9,907	696.5	0.949
50	10,410	731.9	9,873	694.1	0.948
55	10,420	732.6	9,873	694.1	0.947
60	10,400	731.2	9,861	693.3	0.948
65	10,330	726.3	9,723	683.6	0.941
70	10,230	719.2	9,687	681.1	0.947
75	10,520	739.6	9,907	696.5	0.942
80	10,540	741.0	9,980	701.7	0.947
85	10,510	738.9	9,792	688.4	0.932
90	10,480	736.8	9,585	673.9	0.915
95	10,010	703.8	9,206	647.2	0.920
100	<u>10,450</u>	<u>734.7</u>	<u>9,658</u>	<u>679.0</u>	<u>0.924</u>
Avg	10,348	727.5	9,686	681.0	0.936

TABLE XX
TEST NO. 8
TEST SPECIMEN S/N 025
TYPICAL GN₂ IMPACT PRESSURE DATA ACQUIRED
DURING CONTAMINANT TRANSMISSION PORTION OF TEST

<u>IMPACT CYCLE NO.</u>	PRESSURE UPSTREAM OF ISOLATION VALVE		PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN		<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
	<u>(PSIA)</u>	<u>(Kg/cm²)</u>	<u>(PSIA)</u>	<u>(Kg/cm²)</u>	
1	10,520	739.6	9,852	692.7	0.936
5	10,430	733.3	9,757	686.0	0.935
10	10,470	736.1	9,794	688.6	0.935
15	10,480	736.8	9,713	682.9	0.927
20	10,570	743.1	9,963	700.5	0.943
25	10,510	738.9	9,027	634.7	0.859
30	10,670	750.2	10,160	714.3	0.952
35	10,600	745.2	10,040	705.9	0.947
40	10,640	748.1	9,984	702.0	0.938
45	10,360	728.4	9,560	672.1	0.923
50	10,330	726.3	9,440	663.7	0.914
55	10,240	719.9	9,213	647.7	0.900
60	9,906	696.5	8,831	620.9	0.891
65	10,550	741.7	9,805	689.4	0.929
70	10,590	744.5	9,609	675.6	0.907
75	10,850	762.8	9,575	673.2	0.883
80	10,510	738.9	9,759	686.1	0.928
85	10,500	738.2	10,155	714.0	0.967
90	10,450	734.7	9,569	672.8	0.916
95	11,070	778.3	9,931	698.2	0.897
100	<u>10,670</u>	<u>750.2</u>	<u>9,389</u>	<u>660.1</u>	<u>0.880</u>
Avg	10,520	739.6	9,673	680.1	0.919

TABLE XXI

TEST NO. 7

TEST SPECIMEN S/N 023

CONTAMINANT TRANSMISSION TEST

<u>CONTAMINANT ADDITION NO.</u>	<u>QUANTITY OF IDENTIFIABLE CONTAMINANT (Fe₂O₃) ADDED (mg)</u>	<u>SIZE OF LARGEST IDENTIFIABLE PARTICLE (Fe₂O₃) TRANSMITTED BY SPECIMEN (microns)</u>
	<u>Added</u>	<u>Sum</u>
1	19.6	19.6
2	20.3	39.9
3	20.1	60.0
4	20.4	80.4
5	20.3	100.7

TABLE XXII

TEST NO. 8
 TEST SPECIMEN S/N 025

CONTAMINANT TRANSMISSION TEST

CONTAMINANT ADDITION NO.	QUANTITY OF IDENTIFIABLE CONTAMINANT (Fe_2O_3) ADDED (mg)		SIZE OF LARGEST IDENTIFIABLE PARTICLE (Fe_2O_3) TRANSMITTED BY SPECIMEN (microns)
	<u>ADD</u>	<u>SUM</u>	
1	20.0	20.0	10x5
2	20.3	40.3	5x5
3	20.2	60.5	None >3
4	19.9	80.4	None >3
5	20.3	100.7	10x10

TABLE XXIII Part A

TEST NO. 10
 TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	CLEAN CONDITION	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT	
		PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	28.908 ^A	29.066 ^B	29.028 ^C
0.5	0.808	1.017	0.982
1.0	2.066	2.741	3.969
1.5	3.309	4.393	7.376
2.0	4.664	6.199	12.729
2.5	6.219	8.324	22.227
3.0	8.045	10.898	-----
3.5	10.205	14.048	-----
4.0	12.764	17.914	-----
4.5	15.795	22.655	-----
5.0	19.377	28.455	-----
5.5	23.596	-----	-----
6.0	28.553	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.315110 + 1.188598 (\text{log Kg GN}_2/\text{hr}) - 0.299798 (\text{log Kg GN}_2/\text{hr})^2 + 0.842916 (\text{log Kg GN}_2/\text{hr})^3$

Sigma = 0.176

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.437832 + 1.202810 (\text{log Kg GN}_2/\text{hr}) - 0.418515 (\text{log Kg GN}_2/\text{hr})^2 + 1.112984 (\text{log Kg GN}_2/\text{hr})^3$

Sigma = 0.166

C. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.598733 + 1.510071 (\text{log Kg GN}_2/\text{hr}) - 0.554291 (\text{log Kg GN}_2/\text{hr})^2 + 3.729132 (\text{log Kg GN}_2/\text{hr})^3$

Sigma = 0.249

TABLE XXIII Part B

TEST NO. 10
TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		
	CLEAN CONDITION	PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES
TEST SPECIMEN INLET PRESSURE (Kg/cm ²)			
	28.908 ^A	29.066 ^B	29.028 ^C
10	1.309	1.711	2.148
15	2.172	2.882	4.229
20	3.032	4.026	6.526
25	3.935	5.224	9.575
30	4.916	6.539	13.994
35	6.000	8.020	20.623
40	7.210	9.711	-----
45	8.569	11.652	-----
50	10.097	13.889	-----
55	11.817	16.468	-----
60	13.753	19.441	-----
65	15.929	22.867	-----
70	18.372	26.808	-----
75	21.112	-----	-----
80	24.181	-----	-----
85	27.612	-----	-----

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 2.770867 + 5.272182 (\text{log liters GN}_2/\text{min}) - 3.227380 (\text{log liters GN}_2/\text{min})^2$
 $+ 0.842895 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.176

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 3.242786 + 6.647173 (\text{log liters GN}_2/\text{min}) - 4.284036 (\text{log liters GN}_2/\text{min})^2$
 $+ 1.112944 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.166

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 7.680894 + 17.792041 (\text{log liters GN}_2/\text{min}) - 13.508769 (\text{log liters GN}_2/\text{min})^2$
 $+ 3.729680 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.249

TABLE XXIII Part C

TEST NO. 10
 TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		
	CLEAN CONDITION	PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES
TEST SPECIMEN INLET PRESSURE (PSIA)			
	411.2 ^A	413.4 ^B	412.9 ^C
1.0	9.785	12.120	10.400
1.5	18.072	23.592	29.258
2.0	26.136	34.603	48.594
2.5	34.061	45.232	68.101
3.0	42.052	55.838	89.696
3.5	50.286	66.745	115.528
4.0	58.907	78.216	147.882
4.5	68.035	90.467	189.416
5.0	77.771	103.688	243.449
5.5	88.210	118.052	314.264
6.0	99.438	133.725	407.493
6.5	111.540	150.873	-----
7.0	124.600	169.667	-----
7.5	138.703	190.284	-----
8.0	153.937	212.908	-----
8.5	170.393	237.736	-----
9.0	188.164	264.979	-----
9.5	207.350	294.861	-----
10.0	228.053	327.622	-----
10.5	250.382	363.520	-----
11.0	274.451	402.833	-----
11.5	300.380	-----	-----
12.0	328.297	-----	-----
12.5	358.334	-----	-----
13.0	390.632	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 0.990578 + 1.692528 (\log \text{lbs GN}_2/\text{hr}) - 1.167986 (\log \text{lbs GN}_2/\text{hr})^2 + 0.842916 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 2.499

B. $\text{Log (PSID)} = 1.083497 + 1.883758 (\log \text{lbs GN}_2/\text{hr}) - 1.564865 (\log \text{lbs GN}_2/\text{hr})^2 + 1.112983 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 2.364

C. $\text{Log (PSID)} = 1.017030 + 3.209369 (\log \text{lbs GN}_2/\text{hr}) - 4.395217 (\log \text{lbs GN}_2/\text{hr})^2 + 3.729126 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 3.547

TABLE XXIII Part D

TEST NO. 10
 TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	CLEAN CONDITION	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT	
		PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES
		TEST SPECIMEN	INLET PRESSURE (PSIA)
0.4		411.2 ^A	413.4 ^B
0.5		21.914	28.867
0.6		28.844	38.254
0.7		35.722	47.443
0.8		42.680	56.669
0.9		49.830	66.141
1.0		57.268	76.029
1.1		65.072	86.477
1.2		73.313	97.613
1.3		82.051	109.553
1.4		91.347	122.407
1.5		101.256	136.284
1.6		111.833	151.292
1.7		123.134	167.544
1.8		135.215	185.155
1.9		148.132	204.245
2.0		161.944	224.940
2.1		176.712	247.374
2.2		192.498	271.688
2.3		209.368	298.032
2.4		227.390	326.565
2.5		246.635	357.457
2.6		267.177	390.887
2.7		289.094	-----
2.8		312.467	-----
2.9		337.382	-----
3.0		363.928	-----
		392.198	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3$$

A. $\text{Log (PSID)} = 1.813397 + 1.231136 (\text{log SCFM}) + 0.444351 (\text{log SCFM})^2 + 0.842916 (\text{log SCFM})^3$

Sigma = 2.499

B. $\text{Log (PSID)} = 1.936903 + 1.245640 (\text{log SCFM}) + 0.564057 (\text{log SCFM})^2 + 1.112984 (\text{log SCFM})^3$

Sigma = 2.364

C. $\text{Log (PSID)} = 2.243135 + 2.152649 (\text{log SCFM}) + 2.737884 (\text{log SCFM})^2 + 3.729132 (\text{log SCFM})^3$

Sigma = 3.547

TABLE XXIV Part A
TEST NO. 10
TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		AFTER ADDITION OF 15.8 mg OF SYNTHETIC CONTAMINANT	
	CLEAN CONDITION	PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES	AFTER 10 ADDITIONAL IMPACT CYCLES
TEST SPECIMEN INLET PRESSURE (Kg/cm ²)				
	<u>70.551^A</u>	<u>71.375^B</u>	<u>70.949^C</u>	<u>71.395^D</u>
0.5	0.270	0.508	0.606	6.371
1.0	0.773	1.045	1.480	13.784
1.5	1.295	1.624	2.595	26.080
2.0	1.825	2.240	3.936	36.600
2.5	2.366	2.890	5.491	-----
3.0	2.926	3.571	7.255	-----
3.5	3.509	4.280	9.225	-----
4.0	4.120	5.015	11.397	-----
4.5	4.761	5.776	13.770	-----
5.0	5.436	6.560	16.342	-----
5.5	6.147	7.368	19.112	-----
6.0	6.897	8.197	22.081	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.111900 + 1.343337 (\log \text{Kg GN}_2/\text{hr}) - 0.464327 (\log \text{Kg GN}_2/\text{hr})^2 + 0.395577 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.030

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.018939 + 1.069668 (\log \text{Kg GN}_2/\text{hr}) + 0.102995 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.172

C. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.170161 + 1.350106 (\log \text{Kg GN}_2/\text{hr}) + 0.203571 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.082

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 1.139390 + 1.603272 (\log \text{Kg GN}_2/\text{hr}) + 0.490510 (\log \text{Kg GN}_2/\text{hr})^2 - 3.775683 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.075

TABLE XXIV Part B
TEST NO. 10
TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (kg/cm ² Differential)					
	CLEAN CONDITION	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		AFTER ADDITION OF 15.8 mg OF SYNTHETIC CONTAMINANT		
		PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES	AFTER 10 ADDITIONAL IMPACT CYCLES		
				TEST SPECIMEN	INLET PRESSURE (kg/cm ²)	
10	70.551 ^A	0.460	0.712	0.917		8.193
15		0.818	1.093	1.567		14.754
20		1.181	1.494	2.332		23.339
25		1.547	1.913	3.208		31.666
30		1.917	2.350	4.189		-----
35		2.294	2.802	5.274		-----
40		2.679	3.270	6.460		-----
45		3.075	3.751	7.746		-----
50		3.482	4.246	9.130		-----
55		3.903	4.754	10.613		-----
60		4.338	5.275	12.193		-----
65		4.788	5.807	13.870		-----
70		5.254	6.351	15.643		-----
75		5.738	6.906	17.512		-----
80		6.240	7.472	19.477		-----
85		6.761	8.048	21.538		-----
90		7.301	8.635	23.694		-----
95		7.861	9.232	25.946		-----
100		8.443	9.838	28.294		

*At 21.1°C (70°F) and 1.033 kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 2.903413 + 4.009170 (\text{log liters GN}_2/\text{min}) - 1.838262 (\text{log liters GN}_2/\text{min})^2 + 0.395575 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.030

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.081424 + 0.831182 (\text{log liters GN}_2/\text{min}) + 0.102995 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.172

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.120069 + 0.878736 (\text{log liters GN}_2/\text{min}) + 0.203571 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.082

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 5.779241 - 14.661342 (\text{log liters GN}_2/\text{min}) + 13.557845 (\text{log liters GN}_2/\text{min})^2 - 3.762283 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.075

TABLE XXIV Part C
TEST NO. 10
TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL (PSID)			
	CLEAN CONDITION	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		AFTER ADDITION OF 15.8 mg OF SYNTHETIC CONTAMINANT
		PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES	AFTER 10 ADDITIONAL IMPACT CYCLES
		TEST SPECIMEN	INLET PRESSURE (PSIA)	
1.0	1003.5 ^A	3.230	6.559	7.649
1.5		6.333	9.907	12.678
2.0		9.625	13.393	18.468
2.5		12.976	17.008	24.975
3.0		16.348	20.744	32.169
3.5		19.735	24.593	40.030
4.0		23.143	28.549	48.540
4.5		26.580	32.606	57.688
5.0		30.054	36.760	67.462
5.5		33.575	41.008	77.855
6.0		37.148	45.344	88.860
6.5		40.783	49.768	100.470
7.0		44.485	54.274	112.682
7.5		48.259	58.862	125.491
8.0		52.112	63.528	138.894
8.5		56.047	68.271	152.887
9.0		60.070	73.089	167.469
9.5		64.184	77.979	182.637
10.0		68.394	82.941	198.390
10.5		72.702	87.973	214.725
11.0		77.113	93.072	231.643
11.5		81.630	98.239	249.141
12.0		86.256	103.472	267.220
12.5		90.994	108.769	285.877
13.0		95.847	114.130	305.114
13.5		100.819	119.554	324.928
14.0		105.912	125.038	345.321
14.5		111.128	130.584	366.292
15.0		116.472	136.189	387.840

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log lbs GN}_2/\text{hr}) + c (\text{log lbs GN}_2/\text{hr})^2 + d (\text{log lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 0.591510 + 1.802053 (\text{log lbs GN}_2/\text{hr}) - 0.871764 (\text{log lbs GN}_2/\text{hr})^2 + 0.395570 (\text{log lbs GN}_2/\text{hr})^3$

Sigma = 0.433

B. $\text{Log (PSID)} = 0.816828 + 0.998946 (\text{log lbs GN}_2/\text{hr}) + 0.102995 (\text{log lbs GN}_2/\text{hr})^2$

Sigma = 2.451

C. $\text{Log (PSID)} = 0.883624 + 1.210324 (\text{log lbs GN}_2/\text{hr}) + 0.203571 (\text{log lbs GN}_2/\text{hr})^2$

Sigma = 1.173

D. $\text{Log (PSID)} = 1.952557 - 0.068708 (\text{log lbs GN}_2/\text{hr}) + 4.379427 (\text{log lbs GN}_2/\text{hr})^2 - 3.775717 (\text{log lbs GN}_2/\text{hr})^3$

Sigma = 1.070

TABLE XXIV Part D

TEST NO. 10

TEST SPECIMEN S/N 027

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA

FLOW RATE (SCFM)	NET DIFFERENTIAL (PSID)			
	CLEAN CONDITION	AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT		AFTER ADDITION OF 15.8 mg OF SYNTHETIC CONTAMINANT
		PRIOR TO IMPACT CYCLES	AFTER 10 IMPACT CYCLES	AFTER 10 ADDITIONAL IMPACT CYCLES
		TEST SPECIMEN	INLET PRESSURE (PSIA)	
0.4		1003.5 ^A	1015.2 ^B	1009.1 ^C
0.5		7.878	11.539	15.324
0.6		10.765	14.612	20.608
0.7		13.681	17.781	26.424
0.8		16.610	21.039	32.755
0.9		19.551	24.381	39.587
1.0		22.508	27.805	46.909
1.1		25.484	31.306	54.712
1.2		28.487	34.881	62.991
1.3		31.522	38.528	71.738
1.4		34.594	42.243	80.950
1.5		37.708	46.025	90.621
1.6		40.869	49.872	100.748
1.7		44.080	53.782	111.329
1.8		47.346	57.752	122.360
1.9		50.669	61.783	133.839
2.0		54.054	65.872	145.764
2.1		57.503	70.018	158.133
2.2		61.019	74.220	170.946
2.3		64.605	78.477	184.200
2.4		68.262	82.787	197.894
2.5		71.995	87.149	212.028
2.6		75.804	91.564	226.601
2.7		79.692	96.029	241.612
2.8		83.661	100.544	257.060
2.9		87.714	105.109	272.945
3.0		91.852	109.721	289.267
3.1		96.077	114.382	306.025
3.2		100.391	119.090	323.219
3.3		104.797	123.844	340.849
3.4		109.295	128.643	358.914
3.5		113.889	133.488	377.415
		118.579	138.378	396.351

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3$$

A. $\text{Log (PSID)} = 1.406276 + 1.172825 (\text{log SCFM}) - 0.115101 (\text{log SCFM})^2 + 0.395577 (\text{log SCFM})^3$
Sigma = 0.433

B. $\text{Log (PSID)} = 1.495628 + 1.130285 (\text{log SCFM}) + 0.102995 (\text{log SCFM})^2$
Sigma = 2.450

C. $\text{Log (PSID)} = 1.738086 + 1.469918 (\text{log SCFM}) + 0.203571 (\text{log SCFM})^2$
Sigma = 1.173

D. $\text{Log (PSID)} = 2.710446 + 0.911057 (\text{log SCFM}) - 2.842782 (\text{log SCFM})^2 - 3.775705 (\text{log SCFM})^3$
Sigma = 1.069

TABLE XXV
TEST NO. 10
TEST SPECIMEN S/N 027
GN₂ IMPACT PRESSURE DATA

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u> <u>(PSIA)</u>	<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u> <u>(PSIA)</u>	<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
- APPLIED IN FORWARD (HPOF S/N SIDE UPSTREAM) DIRECTION - AFTER ADDITION OF 7.9 mg OF SYNTHETIC CONTAMINANT			
1	9,870	693.9	1.043
2	9,898	695.9	1.042
3	9,849	692.4	1.043
4	9,849	692.4	1.044
5	9,953	699.8	1.034
6	9,974	701.2	1.017
7	10,060	707.3	0.994
8	10,330	726.3	0.993
9	10,230	719.2	1.011
10	10,560	742.4	0.993
AFTER ADDITION OF A TOTAL OF 15.8 mg OF SYNTHETIC CONTAMINANT			
11	10,620	746.7	1.063
12	10,830	761.4	1.067
13	10,580	743.8	1.056
14	10,610	746.0	1.054
15	10,750	755.8	1.033
16	10,610	746.0	1.073
17	10,650	748.8	1.053
18	10,610	746.0	1.063
19	10,710	753.0	1.058
20	10,620	746.7	1.054

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u>		<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u>		<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
	<u>(PSIA)</u>	<u>(kg/cm²)</u>	<u>(PSIA)</u>	<u>(kg/cm²)</u>	
- APPLIED TO THE REVERSE SIDE OF THE SPECIMEN LOADED WITH CONTAMINANT IN THE FORWARD DIRECTION -					
1	10,560	742.4	10,469	736.0	0.991
2	10,670	750.2	10,400	731.2	0.975
3	10,530	740.3	10,297	723.9	0.978
4	10,580	743.8	10,377	729.6	0.981
5	10,600	745.2	10,354	728.0	0.977
6	10,610	746.0	10,411	732.0	0.981
7	10,590	744.5	10,354	728.0	0.978
8	10,600	745.2	10,387	730.3	0.980
9	10,630	747.4	10,434	733.6	0.982
10	10,670	750.2	10,388	730.3	0.974

TABLE XXVI Part A
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 29.177 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)					
	0.0	16.3	32.0	52.2	74.3	105.2
0.5	0.900	1.015	1.042	1.077	1.062	1.096
1.0	2.434	3.017	3.280	3.349	3.446	3.419
1.5	3.908	4.886	5.350	5.460	5.700	5.645
2.0	5.521	6.969	7.686	7.893	8.317	8.263
2.5	7.415	9.537	10.648	11.047	11.736	11.694
3.0	9.706	12.826	14.567	15.302	16.386	16.359
3.5	12.508	17.094	19.825	21.115	22.790	22.768
4.0	15.943	22.648	26.900	29.073	-----	-----
4.5	20.151	-----	-----	-----	-----	-----
5.0	25.294	-----	-----	-----	-----	-----
5.5	-----	-----	-----	-----	-----	-----
6.0	-----	-----	-----	-----	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	29.419	300.9	0.386267	1.208332	-0.422051	1.107994	-----	0.216
16.3	29.189	296.5	0.479516	1.246866	-0.602504	1.572742	-----	0.236
32.0	29.219	301.3	0.515896	1.274092	-0.708344	1.849099	-----	0.224
52.2	29.177	298.6	0.524935	1.262547	-0.664008	1.920505	-----	0.278
74.3	29.304	301.5	0.537365	1.303842	-0.708716	1.991838	-----	0.185
105.2	29.349	295.2	0.533953	1.285375	-0.611622	1.894375	-----	0.252

TABLE XXVI Part B
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 29.177 Kg/cm²

FLOW RATE (Liters GN ₂ /min)*	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)					
	0.1	16.3	32.0	52.2	74.3	105.2
10	1.516	1.827	1.950	2.003	2.024	2.035
15	2.560	3.178	3.460	3.531	3.640	3.608
20	3.581	4.471	4.890	4.987	5.194	5.142
25	4.650	5.835	6.407	6.554	6.874	6.818
30	5.824	7.370	8.143	8.375	8.838	8.786
35	7.144	9.161	10.209	10.575	11.223	11.180
40	8.650	11.285	12.715	13.282	14.173	14.140
45	10.378	13.825	15.782	16.636	17.850	17.826
50	12.367	16.872	19.548	20.806	22.449	22.427
55	14.659	20.533	24.178	25.996	28.205	28.173
60	17.300	24.929	-----	-----	-----	-----
65	20.339	-----	-----	-----	-----	-----
70	23.834	-----	-----	-----	-----	-----
75	27.847	-----	-----	-----	-----	-----
80	-----	-----	-----	-----	-----	-----
85	-----	-----	-----	-----	-----	-----
90	-----	-----	-----	-----	-----	-----
95	-----	-----	-----	-----	-----	-----
100	-----	-----	-----	-----	-----	-----

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b \text{ (log liters GN}_2/\text{min)} + c \text{ (log liters GN}_2/\text{min)}^2 + d \text{ (log liters GN}_2/\text{min)}^3 + e \text{ (log liters GN}_2/\text{min)}^4$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	29.419	300.9	-3.297901	6.641162	-4.270482	1.108010	-----	0.216
16.3	29.189	296.5	-4.212116	8.965840	-6.064746	1.572668	-----	0.236
32.0	29.219	301.3	-4.777566	10.348496	-7.129779	1.848867	-----	0.224
52.2	29.177	298.6	-4.806450	10.521216	-7.333299	1.920235	-----	0.278
74.3	29.304	301.5	-5.012361	10.952666	-7.625606	1.991528	-----	0.185
105.2	29.349	295.2	-4.713326	10.318179	-7.190522	1.894191	-----	0.252

TABLE XXVI Part C
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)					
	0.0	16.3	32.0	52.2	74.3	105.2
1.0	10.711	11.743	11.834	12.260	11.983	12.499
1.5	20.903	25.106	26.752	27.494	27.744	27.927
2.0	30.712	37.894	41.077	41.995	43.032	42.790
2.5	40.195	50.011	54.533	55.618	57.515	56.968
3.0	49.662	61.989	67.781	69.114	71.927	71.205
3.5	59.399	74.345	81.483	83.206	87.026	86.229
4.0	69.636	87.503	96.194	98.493	103.458	102.656
4.5	80.565	101.822	112.387	115.495	121.792	121.034
5.0	92.354	117.622	130.496	134.695	142.567	141.885
5.5	105.155	135.213	150.946	156.579	166.332	165.744
6.0	119.115	154.904	174.176	181.661	193.668	193.180
6.5	134.383	177.019	200.661	210.499	225.216	224.819
7.0	151.106	201.905	230.916	243.715	261.691	261.362
7.5	169.442	229.938	265.516	282.008	303.902	303.600
8.0	189.554	261.531	305.106	326.170	352.770	352.429
8.5	211.615	297.138	350.410	377.098	409.346	408.871
9.0	235.809	337.262	402.245	-----	-----	-----
9.5	262.335	382.459	-----	-----	-----	-----
10.0	291.404	-----	-----	-----	-----	-----
10.5	323.241	-----	-----	-----	-----	-----
11.0	358.091	-----	-----	-----	-----	-----
11.5	396.214	-----	-----	-----	-----	-----
12.0	-----	-----	-----	-----	-----	-----
12.5	-----	-----	-----	-----	-----	-----
13.0	-----	-----	-----	-----	-----	-----
13.5	-----	-----	-----	-----	-----	-----
14.0	-----	-----	-----	-----	-----	-----
14.5	-----	-----	-----	-----	-----	-----
15.0	-----	-----	-----	-----	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log lbs GN}_2/\text{hr}) + c (\text{log lbs GN}_2/\text{hr})^2 + d (\text{log lbs GN}_2/\text{hr})^3 + e (\text{log lbs GN}_2/\text{hr})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	418.4	81.9	1.029821	1.889944	-1.563264	1.107994	-----	3.066
16.3	415.2	74.0	1.069761	2.216732	-2.222399	1.572742	-----	3.357
32.0	415.6	82.6	1.073135	2.414358	-2.612882	1.849100	-----	3.186
52.2	415.0	77.8	1.088474	2.397619	-2.642090	1.920504	-----	3.959
74.3	416.8	82.9	1.078570	2.494836	-2.760267	1.991835	-----	2.630
105.2	417.4	71.7	1.096887	2.375235	-2.562790	1.894374	-----	3.582

TABLE XXVI Part D
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)					
	0.0	16.3	32.0	52.2	74.3	105.2
0.4	25.599	31.263	33.662	34.496	35.104	35.076
0.5	33.969	42.078	45.735	46.706	48.031	47.669
0.6	42.168	52.511	57.300	58.428	60.510	59.917
0.7	50.405	62.928	68.819	70.177	73.064	72.334
0.8	58.860	73.658	80.719	82.416	86.178	85.384
0.9	67.685	84.978	93.359	95.535	100.274	99.469
1.0	77.007	97.126	107.054	109.877	115.727	114.951
1.1	86.938	110.316	122.091	125.761	132.891	132.172
1.2	97.581	124.752	138.748	143.502	152.121	151.477
1.3	109.035	140.634	157.306	163.425	173.783	173.223
1.4	121.394	158.167	178.059	185.874	198.269	197.796
1.5	134.756	177.567	201.322	211.222	226.009	225.614
1.6	149.218	199.061	227.436	239.882	257.474	257.140
1.7	164.882	222.896	256.775	272.307	293.192	292.889
1.8	181.854	249.336	289.753	309.003	333.751	333.434
1.9	200.246	278.669	326.826	350.537	379.812	379.418
2.0	220.175	311.211	368.500	397.540	-----	-----
2.1	241.766	347.305	-----	-----	-----	-----
2.2	265.149	387.327	-----	-----	-----	-----
2.3	290.466	-----	-----	-----	-----	-----
2.4	317.864	-----	-----	-----	-----	-----
2.5	347.502	-----	-----	-----	-----	-----
2.6	379.548	-----	-----	-----	-----	-----
2.7	414.181	-----	-----	-----	-----	-----
2.8	-----	-----	-----	-----	-----	-----
2.9	-----	-----	-----	-----	-----	-----
3.0	-----	-----	-----	-----	-----	-----
3.1	-----	-----	-----	-----	-----	-----
3.2	-----	-----	-----	-----	-----	-----
3.3	-----	-----	-----	-----	-----	-----
3.4	-----	-----	-----	-----	-----	-----
3.5	-----	-----	-----	-----	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	418.4	81.9	1.886529	1.247783	0.556115	1.107995	-----	3.066
16.3	415.2	74.0	1.987335	1.300851	0.785953	1.572742	-----	3.357
32.0	415.6	82.6	2.029604	1.337581	0.924090	1.849099	-----	3.186
52.2	415.0	77.8	2.040905	1.370680	1.031464	1.920505	-----	3.959
74.3	416.8	82.9	2.063433	1.404194	1.049730	1.991838	-----	2.630
105.2	417.4	71.7	2.060511	1.417552	1.060783	1.894375	-----	3.582

TABLE XXVII Part A
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)					
	0.0	16.3	32.0	52.2	74.3	105.2
0.5	0.465	0.560	0.575	0.588	0.606	0.633
1.0	0.976	1.201	1.215	1.255	1.287	1.330
1.5	1.536	1.904	1.921	1.995	2.049	2.119
2.0	2.139	2.655	2.682	2.798	2.883	2.990
2.5	2.780	3.449	3.492	3.655	3.780	3.936
3.0	3.456	4.281	4.347	4.563	4.737	4.953
3.5	4.164	5.148	5.243	5.517	5.749	6.037
4.0	4.902	6.046	6.177	6.515	6.813	7.185
4.5	5.669	6.973	7.149	7.553	7.928	8.395
5.0	6.463	7.929	8.155	8.631	9.090	9.665
5.5	7.283	8.910	9.194	9.747	10.298	10.994
6.0	8.129	9.917	10.266	10.898	11.551	12.379

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

TOTAL QUANTITY

OF

SYNTHETIC
CONTAMINANT
ADDED (mg)

AVG. TEST
SPECIMEN INLET
PRESSURE (Kg/cm²)

AVG. TEST
SPECIMEN INLET
TEMPERATURE (°C)

EQUATION COEFFICIENTS

	<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>	<u>SIGMA</u>
0.0	-0.010759	1.100562	0.106302	-----	-----	0.016
16.3	0.079569	1.123327	0.070531	-----	-----	0.055
32.0	0.084665	1.111087	0.102609	-----	-----	0.028
52.2	0.098536	1.125668	0.103829	-----	-----	0.045
74.3	0.109464	1.125233	0.128105	-----	-----	0.025
105.2	0.123945	1.119841	0.160759	-----	-----	0.025

TABLE XXVII Part B
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

FLOW RATE (liters GN ₂ /min)*	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)					
	0.0	16.3	32.0	52.2	74.3	105.2
10	0.689	0.799	0.816	0.839	0.861	0.894
15	1.062	1.258	1.274	1.316	1.349	1.395
20	1.455	1.744	1.762	1.828	1.876	1.939
25	1.868	2.256	2.277	2.371	2.438	2.525
30	2.298	2.789	2.818	2.942	3.033	3.148
35	2.744	3.343	3.382	3.539	3.658	3.807
40	3.205	3.914	3.968	4.161	4.312	4.500
45	3.681	4.503	4.575	4.806	4.994	5.227
50	4.171	5.108	5.201	5.472	5.701	5.986
55	4.673	5.728	5.845	6.160	6.434	6.775
60	5.188	6.363	6.508	6.868	7.192	7.596
65	5.716	7.011	7.189	7.596	7.974	8.445
70	6.254	7.673	7.886	8.343	8.778	9.324
75	6.805	8.347	8.599	9.108	9.605	10.231
80	7.366	9.034	9.328	9.890	10.454	11.166
85	7.938	9.732	10.073	10.690	11.325	12.129
90	8.520	10.442	10.832	11.507	12.217	13.118
95	9.113	11.164	11.607	12.341	13.130	14.134
100	9.716	11.896	12.395	13.191	14.062	15.176

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	71.311	300.0	-1.107773	0.844688	0.101467	-----	-----	0.015
16.3	70.872	301.3	-1.135452	0.971028	0.067197	-----	-----	0.056
32.0	71.367	295.4	-1.064167	0.873494	0.102609	-----	-----	0.028
52.2	70.914	294.1	-1.065542	0.885250	0.103829	-----	-----	0.045
74.3	71.347	299.2	-1.021571	0.828603	0.128106	-----	-----	0.025
105.2	71.283	299.3	-0.957078	0.747600	0.160760	-----	-----	0.025

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TABLE XXVII Part C
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022
 NOMINAL TEST SPECIMEN INLET PRESSURE = 1,000 PSIA

(1bs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)					
	0.0	16.3	32.0	52.2	74.3	105.2
1.0	5.984	7.167	7.384	7.539	7.785	8.155
1.5	9.146	11.137	11.343	11.646	11.964	12.421
2.0	12.472	15.319	15.518	15.999	16.409	16.977
2.5	15.948	19.686	19.891	20.574	21.101	21.806
3.0	19.562	24.218	24.443	25.351	26.020	26.893
3.5	23.306	28.901	29.163	30.317	31.153	32.227
4.0	27.172	33.723	34.041	35.459	36.490	37.796
4.5	31.153	38.675	39.068	40.769	42.020	43.591
5.0	35.245	43.750	44.237	46.238	47.736	49.606
5.5	39.442	48.941	49.542	51.860	53.630	55.834
6.0	43.741	54.243	54.978	57.628	59.698	62.269
6.5	48.137	59.650	60.539	63.537	65.933	68.905
7.0	52.629	65.159	66.223	69.583	72.330	75.739
7.5	57.213	70.765	72.024	75.761	78.887	82.766
8.0	61.886	76.465	77.939	82.068	85.598	89.982
8.5	66.646	82.256	83.966	88.500	92.460	97.385
9.0	71.491	88.136	90.102	95.054	99.470	104.970
9.5	76.419	94.101	96.344	101.727	106.625	112.736
10.0	81.428	100.150	102.690	108.518	113.923	120.679
10.5	86.516	106.279	109.137	115.422	121.360	128.797
11.0	91.683	112.489	115.684	122.438	128.935	137.088
11.5	96.925	118.775	122.328	129.546	136.645	145.550
12.0	102.243	125.137	129.068	136.798	144.488	154.180
12.5	107.635	131.573	135.902	144.138	152.463	162.977
13.0	113.099	138.081	142.829	151.582	160.567	171.939
13.5	118.634	144.661	149.847	159.129	168.799	181.065
14.0	124.240	151.310	156.954	166.777	177.157	190.352
14.5	129.240	158.028	164.150	174.524	185.640	199.800
15.0	135.659	164.813	171.432	182.369	194.246	209.406

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	1014.3	80.4	0.777023	1.027365	0.106384	-----	-----	0.225
16.3	1008.0	82.6	0.855361	1.074472	0.070816	-----	-----	0.784
32.0	1015.1	72.0	0.868289	1.040630	0.102609	-----	-----	0.398
52.2	1008.6	69.6	0.877298	1.054373	0.103829	-----	-----	0.639
74.3	1014.8	78.8	0.891236	1.037269	0.128105	-----	-----	0.353
105.2	1013.9	79.0	0.911418	1.009455	0.160759	-----	-----	0.359

TABLE XXVII Part D
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 022

NOMINAL TEST SPECIMEN INLET PRESSURE = 1,000 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)					
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)					
0.0	16.3	32.0	52.2	74.3	105.2	
0.4	10.706	13.103	13.292	13.676	14.034	14.540
0.5	13.647	16.799	16.989	17.536	17.983	18.594
0.6	16.698	20.628	20.829	21.558	22.112	22.850
0.7	19.852	24.580	24.803	25.730	26.410	27.298
0.8	23.103	28.644	28.903	30.043	30.869	31.931
0.9	26.446	32.841	33.122	34.490	35.482	36.742
1.0	29.877	37.083	37.455	39.064	40.242	41.726
1.1	33.392	41.447	41.896	43.760	45.144	46.876
1.2	36.988	45.901	46.442	48.574	50.182	52.188
1.3	40.663	50.440	51.089	53.500	55.354	57.659
1.4	44.414	55.062	55.832	58.535	60.654	63.285
1.5	48.238	59.764	60.671	63.676	66.080	69.062
1.6	52.133	64.542	65.600	68.921	71.629	74.989
1.7	56.098	69.395	70.620	74.265	77.298	81.061
1.8	60.132	74.319	75.726	79.707	83.083	87.276
1.9	64.231	79.314	80.916	85.244	88.984	93.633
2.0	68.395	84.376	86.190	90.875	94.998	100.128
2.1	72.623	89.505	91.545	96.596	101.122	106.761
2.2	76.914	94.698	96.980	102.407	107.355	113.530
2.3	81.265	99.955	102.492	108.306	113.695	120.431
2.4	85.676	105.273	108.082	114.291	120.141	127.465
2.5	90.147	110.652	113.746	120.361	126.690	134.629
2.6	94.675	116.089	119.484	126.514	133.342	141.923
2.7	99.261	121.585	125.296	132.749	140.095	149.344
2.8	103.902	127.138	131.178	139.064	146.948	156.892
2.9	108.599	132.746	137.132	145.459	153.900	164.565
3.0	113.351	138.410	143.154	151.932	160.949	172.362
3.1	118.157	144.127	149.246	158.483	168.094	180.282
3.2	123.016	149.898	155.405	165.110	175.334	188.324
3.3	127.927	155.721	161.631	171.812	182.669	196.488
3.4	132.890	161.595	167.923	178.589	190.096	204.771
3.5	137.905	167.520	174.280	185.438	197.617	213.174

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3 + e (\log \text{SCFM})^4$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	1014.3	80.4	1.475334	1.162660	0.107018	-----	-----	0.224
16.3	1008.0	82.6	1.569179	1.164234	0.072514	-----	-----	0.780
32.0	1015.1	72.0	1.573510	1.171477	0.102609	-----	-----	0.398
52.2	1008.6	69.6	1.591778	1.186777	0.103829	-----	-----	0.639
74.3	1014.8	78.8	1.604679	1.200629	0.128105	-----	-----	0.353
105.2	1013.9	79.0	1.620402	1.214456	0.160759	-----	-----	0.359

TABLE XXVIII . Part A

TEST NO. 12

CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 028NOMINAL TEST SPECIMEN, INLET PRESSURE = 29.177 Kg/cm²

(Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS	
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW			
	FORWARD FLOW				5.3	11.1		
(Kg GN ₂ /hr)	0.0	5.2*	5.2	10.2				
0.5	0.937	1.070	0.845	0.686		0.873	1.114	
1.0	2.451	3.178	2.471	2.300		2.664	3.394	
1.5	3.920	5.318	4.116	4.128		4.422	6.086	
2.0	5.510	7.816	5.968	6.437		6.428	9.757	
2.5	7.340	10.957	8.197	9.538		8.926	15.035	
3.0	9.499	15.017	10.952	13.787		12.143	22.714	
3.5	12.074	20.306	14.388	19.632		16.329	-----	
4.0	15.150	27.201	18.680	27.657		21.790	-----	
4.5	18.824	-----	24.035	-----		28.903	-----	
5.0	23.205	-----	-----	-----		-----	-----	
5.5	28.413	-----	-----	-----		-----	-----	
6.0	-----	-----	-----	-----		-----	-----	

*After 2 high pressure impact cycles.

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS				SIGMA
			a	b	c	d	
<u>FORWARD FLOW</u>							
0.0	29.230	298.1	0.389276	1.193057	-0.361244	0.933793	0.179
5.2*	29.011	295.1	0.502092	1.305541	-0.451393	1.420984	0.147
5.2	29.060	294.5	0.392951	1.301463	-0.457706	1.194976	0.117
10.2	29.179	297.7	0.361721	1.468884	-0.434043	1.617833	0.136
<u>REVERSE FLOW</u>							
5.3	29.106	299.6	0.425453	1.302237	-0.562160	1.523855	0.146
11.1	29.417	299.3	0.530749	1.412390	-0.140577	1.691033	0.084
<u>FORWARD FLOW AFTER REVERSE FLOW</u>							
----	29.060	297.7	0.501768	1.545300	-2.081682	6.572593	0.311

*After 2 high pressure impact cycles

TABLE XXVIII Part B
 TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 29.177 Kg/cm²

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS	
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW			
	FORWARD FLOW				5.3	11.1		
0.0	5.2**	5.2	10.2					
10	1.543	1.903	1.484	1.297	1.585	1.985	1.515	
15	2.577	3.356	2.610	2.446	2.813	3.603	3.384	
20	3.594	4.831	3.746	3.698	4.027	5.435	5.009	
25	4.655	6.446	4.962	5.151	5.332	7.679	6.981	
30	5.806	8.304	6.322	6.907	6.818	10.533	9.932	
35	7.081	10.495	7.876	9.071	8.560	14.219	14.689	
40	8.510	13.112	9.675	11.764	10.635	19.004	22.588	
45	10.122	16.254	11.769	15.125	13.122	25.217	-----	
50	11.945	20.031	14.213	19.321	16.112	-----	-----	
55	14.009	24.575	17.066	24.553	19.710	-----	-----	
60	16.345	-----	20.396	-----	24.035	-----	-----	
65	18.987	-----	24.277	-----	-----	-----	-----	
70	21.972	-----	28.794	-----	-----	-----	-----	
75	25.341	-----	-----	-----	-----	-----	-----	

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

**After 2 high pressure impact cycles

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS				SIGMA
			a	b	c	d	
<u>FORWARD FLOW</u>							
0.0	29.230	298.1	-2.925350	5.784554	-3.604603	0.933803	0.179
5.2*	29.011	295.1	-3.818795	8.063003	-5.385550	1.420674	0.147
5.2	29.060	294.5	-3.581505	7.165958	-4.607780	1.194883	0.136
10.2	29.179	297.7	-4.430979	8.978789	-6.052670	1.617705	0.136
<u>REVERSE FLOW</u>							
5.3	29.106	299.6	-4.200471	8.731488	-5.854803	1.523828	0.146
11.1	29.417	299.3	-3.917072	8.537757	-6.013899	1.691011	0.084
<u>FORWARD FLOW AFTER REVERSE FLOW</u>							
-----	29.060	297.7	-14.277939	32.796561	-24.911103	6.572848	0.311

*After 2 high pressure impact cycles

TABLE XXVIII Part C
 TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (lbs GN2/hr)	NET DIFFERENTIAL PRESSURE (PSID)						
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW		FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS
	FORWARD FLOW				5.3	11.1	
0.0	5.2*	5.2	10.2				
1.0	11.280	12.478	9.927	7.830	10.079	12.997	4.101
1.5	21.295	26.151	20.413	17.757	21.768	27.271	20.294
2.0	30.981	39.715	30.902	28.294	33.285	42.036	38.475
2.5	40.411	53.122	41.291	39.256	44.477	57.642	54.202
3.0	49.850	66.847	51.849	50.974	55.753	74.860	69.182
3.5	59.534	81.371	62.867	63.853	67.536	94.468	85.951
4.0	69.654	97.111	74.599	78.294	80.194	117.234	106.923
4.5	80.367	114.444	87.269	94.703	94.049	143.961	134.684
5.0	91.809	133.727	101.080	113.499	109.401	175.524	172.463
5.5	104.101	155.315	116.229	135.130	126.543	212.908	224.655
6.0	117.357	179.575	132.910	160.090	145.775	257.236	297.484
6.5	131.689	206.898	151.323	188.929	167.414	309.806	399.915
7.0	147.207	237.705	171.676	222.262	191.800	372.118	-----
7.5	164.025	272.456	194.188	260.784	219.304	-----	-----
8.0	182.260	311.656	219.095	305.281	250.335	-----	-----
8.5	202.031	355.860	246.648	-----	285.341	-----	-----
9.0	223.467	405.682	277.119	-----	324.819	-----	-----
9.5	246.701	-----	310.801	-----	369.321	-----	-----
10.0	271.873	-----	348.010	-----	-----	-----	-----
10.5	299.132	-----	389.091	-----	-----	-----	-----
11.0	328.635	-----	-----	-----	-----	-----	-----
11.5	360.548	-----	-----	-----	-----	-----	-----
12.0	395.049	-----	-----	-----	-----	-----	-----

*After 2 high pressure impact cycles

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS				SIGMA
			a	b	c	d	
<u>FORWARD FLOW</u>							
0.0	415.7	77.0	1.052292	1.771314	-1.323033	0.933793	2.544
5.2*	412.6	71.5	1.096147	2.117980	-1.914978	1.420983	2.098
5.2	413.3	70.4	0.996808	2.038316	-1.688508	1.194976	1.660
10.2	415.0	76.2	0.893774	2.339021	-2.100381	1.617834	1.937
<u>REVERSE FLOW</u>							
5.3	414.0	79.6	1.003422	2.227111	-2.131700	1.523854	2.073
11.1	418.4	79.1	1.113828	2.106900	-1.882306	1.691032	1.201
<u>FORWARD FLOW AFTER REVERSE FLOW</u>							
----	413.3	76.2	0.612858	5.298899	-8.851330	6.572595	4.422

*After 2 high pressure impact cycles

TABLE XXVIII Part D
TEST NO. 12
CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 028
NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS	
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW			
	FORWARD FLOW				5.3	11.1		
0.0	25.922	32.607	25.397	22.697	27.272	34.193	29.166	
0.5	34.213	44.284	34.445	31.972	37.121	47.227	44.079	
0.6	42.378	55.952	43.477	41.633	46.816	61.086	57.314	
0.7	50.590	67.939	52.684	51.926	56.643	76.285	70.387	
0.8	58.999	80.555	62.254	63.118	66.878	93.330	84.956	
0.9	67.731	94.074	72.353	75.472	77.758	112.725	102.591	
1.0	76.890	108.742	83.128	89.251	89.498	134.987	124.948	
1.1	86.567	124.795	94.717	104.726	102.296	160.677	153.993	
1.2	96.845	142.464	107.248	122.183	116.344	190.406	192.253	
1.3	107.801	161.985	120.849	141.927	131.834	224.861	243.107	
1.4	119.507	183.602	135.648	164.295	148.966	264.815	311.161	
1.5	132.037	207.576	151.775	189.653	167.951	311.143	402.757	
1.6	145.464	234.182	169.369	218.410	189.012	364.839	-----	
1.7	159.861	263.722	188.571	251.017	212.392	-----	-----	
1.8	175.304	296.520	209.535	287.977	238.353	-----	-----	
1.9	191.871	332.929	232.421	329.851	267.180	-----	-----	
2.0	209.644	373.333	257.401	377.262	299.184	-----	-----	
2.1	228.708	-----	284.659	-----	334.705	-----	-----	
2.2	249.151	-----	314.390	-----	374.115	-----	-----	
2.3	271.066	-----	346.806	-----	-----	-----	-----	
2.4	294.550	-----	382.131	-----	-----	-----	-----	
2.5	319.706	-----	-----	-----	-----	-----	-----	
2.6	346.641	-----	-----	-----	-----	-----	-----	
2.7	375.469	-----	-----	-----	-----	-----	-----	
2.8	406.308	-----	-----	-----	-----	-----	-----	

*After 2 high pressure impact cycles

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS				SIGMA
			a	b	c	d	
<u>FORWARD FLOW</u>							
0.0	415.7	77.0	1.885870	1.223040	0.463133	0.933793	2.544
5.2*	412.6	71.5	2.036396	1.409037	0.803089	1.420984	2.097
5.2	413.3	70.4	1.919749	1.342528	0.597251	1.194976	1.660
10.2	415.0	76.2	1.950612	1.633731	0.994223	1.617834	1.937
<u>REVERSE FLOW</u>							
5.3	414.0	79.6	1.951814	1.367265	0.783139	1.523855	2.073
11.1	418.4	79.1	2.130293	1.768973	1.352311	1.691033	1.201
<u>FORWARD FLOW AFTER REVERSE FLOW</u>							
----	413.3	76.2	2.096730	2.027645	3.720776	6.572593	4.422

*After 2 high pressure impact cycles

TABLE XXIX Part A

TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS	
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW			
	FORWARD FLOW							
0.0	5.2*	5.2	10.2		5.3	11.1		
0.5	0.449	0.565	0.416	0.351	0.445	0.536	0.513	
1.0	0.940	1.251	0.936	0.837	0.991	1.267	1.164	
1.5	1.469	2.020	1.524	1.448	1.611	2.176	1.977	
2.0	2.029	2.853	2.165	2.174	2.293	3.248	2.946	
2.5	2.617	3.742	2.852	3.010	3.029	4.474	4.067	
3.0	3.229	4.681	3.580	3.952	3.813	5.849	5.338	
3.5	3.864	5.664	4.345	4.999	4.643	7.368	6.758	
4.0	4.519	6.689	5.144	6.147	5.514	9.029	8.327	
4.5	5.194	7.753	5.974	7.397	6.425	10.828	10.044	
5.0	5.887	8.852	6.835	8.747	7.373	12.765	11.911	
5.5	6.597	9.986	7.724	10.197	8.358	14.838	13.928	
6.0	7.324	11.153	8.641	11.746	9.377	17.045	16.095	

*After 2 high pressure impact cycles

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential}) = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS			SIGMA
			a	b	c	
<u>FORWARD FLOW</u>						
0.0	70.914	294.1	-0.026829	0.087518	0.074869	0.016
5.2*	71.046	292.3	0.097311	1.169418	0.066215	0.020
5.2	70.865	288.5	-0.028728	1.190168	0.064656	0.024
10.2	71.116	292.6	-0.077073	1.315036	0.204241	0.030
<u>REVERSE FLOW</u>						
5.3	71.403	298.0	-0.004030	1.182954	0.091808	0.023
11.1	70.886	296.1	0.102747	1.300040	0.193604	0.070
<u>FORWARD FLOW AFTER REVERSE FLOW</u>						
----	70.677	294.5	0.065835	1.260268	0.264519	0.033

*After 2 high pressure impact cycles

TABLE XXIX Part B
 TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

(liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS	
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW			
	FORWARD FLOW							
0.0	5.2**	5.2	10.2		5.3	11.1		
10	0.636	0.821	0.610	0.525	0.648	0.799	0.747	
15	0.984	1.315	0.984	0.885	1.042	1.339	1.228	
20	1.351	1.846	1.390	1.305	1.470	1.963	1.786	
25	1.733	2.410	1.823	1.781	1.929	2.668	2.420	
30	2.129	3.003	2.280	2.311	2.416	3.449	3.128	
35	2.538	3.622	2.759	2.893	2.929	4.304	3.910	
40	2.959	4.265	3.257	3.528	3.465	5.231	4.764	
45	3.391	4.931	3.774	4.213	4.024	6.229	5.691	
50	3.834	5.618	4.309	4.948	4.604	7.295	6.689	
55	4.287	6.326	4.860	5.733	5.204	8.431	7.760	
60	4.750	7.052	5.427	6.567	5.824	9.634	8.902	
65	5.222	7.796	6.009	7.450	6.462	10.904	10.117	
70	5.702	8.558	6.605	8.381	7.119	12.240	11.403	
75	6.191	9.337	7.215	9.360	7.794	13.642	12.762	
80	6.688	10.132	7.839	10.388	8.485	15.110	14.194	
85	7.194	10.943	8.476	11.463	9.193	16.643	15.698	
90	7.707	11.769	9.125	12.586	9.918	18.240	17.275	
95	8.227	12.610	9.787	13.757	10.658	19.902	18.926	
100	8.755	13.465	10.460	14.976	11.414	21.629	20.650	

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

**After 2 high pressure impact cycles

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°C)	EQUATION COEFFICIENTS			SIGMA
			a	b	c	
<u>FORWARD FLOW</u>						
0.0	70.914	294.1	-1.185558	0.914158	0.074869	0.016
5.2*	71.046	292.3	-1.167838	1.016097	0.066215	0.020
5.2	70.865	288.5	-1.319990	1.040457	0.064656	0.024
10.2	71.116	292.6	-1.325801	0.842113	0.204241	0.030
<u>REVERSE FLOW</u>						
5.3	71.403	298.0	-1.250545	0.970372	0.091808	0.023
11.1	70.886	296.1	-1.142878	0.851748	0.193604	0.070
<u>FORWARD FLOW AFTER REVERSE FLOW</u>						
----	70.677	294.5	-1.038688	0.647771	0.264519	0.033

*After 2 high pressure impact cycles

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TABLE XXIX Part C
 TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 1,000 PSIA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)						
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)				REVERSE FLOW		FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS
	FORWARD FLOW				5.3	11.1	
0.0	5.2*	5.2	10.2				
1.0	5.776	7.188	5.288	4.452	5.671	6.796	6.566
1.5	8.839	11.392	8.454	7.273	8.989	11.060	10.363
2.0	12.031	15.884	11.859	10.487	12.563	15.889	14.655
2.5	15.338	20.624	15.469	14.072	16.362	21.248	19.429
3.0	18.750	25.583	19.260	18.010	20.365	27.111	24.671
3.5	22.258	30.741	23.216	22.291	24.555	33.459	30.372
4.0	25.856	36.083	27.323	26.905	28.919	40.278	36.527
4.5	29.537	41.596	31.571	31.845	33.447	47.555	43.129
5.0	33.297	47.269	35.952	37.106	38.132	55.281	50.176
5.5	37.132	53.094	40.458	42.681	42.965	63.449	57.663
6.0	41.039	59.063	45.082	48.568	47.940	72.050	65.590
6.5	45.015	65.170	49.821	54.762	53.053	81.080	73.955
7.0	49.057	71.410	54.669	61.262	58.298	90.533	82.755
7.5	53.163	77.776	59.621	68.064	63.671	100.406	91.992
8.0	57.329	84.266	64.675	75.167	69.168	110.693	101.664
8.5	61.556	90.874	69.827	82.568	74.786	121.392	111.771
9.0	65.840	97.597	75.074	90.266	80.522	132.499	122.313
9.5	70.180	104.431	80.413	98.260	86.373	144.013	133.290
10.0	74.575	111.374	85.842	106.548	92.336	155.930	144.704
10.5	79.023	118.423	91.358	115.129	98.408	168.248	156.554
11.0	83.523	125.575	96.959	124.002	104.588	180.966	168.842
11.5	88.074	132.828	102.644	133.167	110.874	194.082	181.567
12.0	92.675	140.179	108.410	142.623	117.263	207.594	194.732
12.5	97.324	147.626	114.255	152.369	123.753	221.501	208.336
13.0	102.020	155.168	120.179	162.405	130.344	235.801	222.382
13.5	106.763	162.802	126.178	172.730	137.032	250.494	236.869
14.0	111.552	170.526	132.253	183.344	143.817	265.577	251.800
14.5	116.386	178.340	138.402	194.246	150.698	281.052	267.175
15.0	121.265	186.241	144.623	205.437	157.673	296.915	282.996

*After 2 high pressure impact cycles

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log lbs GN}_2/\text{hr}) + c (\text{log lbs GN}_2/\text{hr})^2$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS			SIGMA
			a	b	c	
<u>FORWARD FLOW</u>						
0.0	1008.6	69.8	0.761617	1.036109	0.074869	0.225
5.2*	1010.5	66.5	0.856618	1.123952	0.066215	0.288
5.2	1007.9	59.6	0.723272	1.145772	0.064656	0.342
10.2	1011.5	67.1	0.648510	1.174793	0.204241	0.423
<u>REVERSE FLOW</u>						
5.3	1015.6	76.7	0.753647	1.119914	0.091808	0.322
11.1	1008.2	73.4	0.832224	1.167101	0.193604	1.001
<u>FORWARD FLOW AFTER REVERSE FLOW</u>						
----	1005.3	70.4	0.817327	1.078635	0.264519	0.465

*After 2 high pressure impact cycles

TABLE XXIX Part D
 TEST NO. 12
 CONTAMINATED CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 028
 NOMINAL TEST SPECIMEN INLET PRESSURE = 1,000 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)						
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)						FLOW IN FORWARD DIRECTION FOLLOWING REVERSE FLOW RUNS
	FORWARD FLOW		REVERSE FLOW				
0.0	5.2*	5.2	10.2	5.3	11.1		
0.4	10.333	13.483	10.036	8.746	10.649	13.276	12.332
0.5	13.147	17.475	13.069	11.669	13.835	17.659	16.230
0.6	16.044	21.645	16.248	14.867	17.184	22.434	20.488
0.7	19.019	25.976	19.561	18.330	20.683	27.586	25.097
0.8	22.066	30.457	22.998	22.051	24.323	33.103	30.051
0.9	25.180	35.076	26.548	26.022	28.094	38.975	35.348
1.0	28.358	39.826	30.207	30.241	31.991	45.194	40.983
1.1	31.597	44.699	33.967	34.702	36.007	51.753	46.953
1.2	34.894	49.690	37.823	39.402	40.137	58.648	53.257
1.3	38.246	54.792	41.772	44.338	44.378	65.872	59.893
1.4	41.652	60.002	45.810	49.509	48.724	73.423	66.859
1.5	45.109	65.314	49.933	54.911	53.174	81.296	74.155
1.6	48.616	70.727	54.138	60.543	57.723	89.488	81.780
1.7	52.170	76.236	58.422	66.403	62.369	97.996	89.733
1.8	55.772	81.837	62.783	72.490	67.109	106.818	98.015
1.9	59.419	87.530	67.220	78.802	71.941	115.951	106.624
2.0	63.111	93.311	71.728	85.339	76.863	125.393	115.562
2.1	66.845	99.177	76.308	92.100	81.873	135.142	124.828
2.2	70.621	105.127	80.957	99.083	86.969	145.197	134.422
2.3	74.439	111.158	85.673	106.287	92.150	155.556	144.345
2.4	78.296	117.269	90.455	113.713	97.413	166.218	154.497
2.5	82.193	123.458	95.301	121.359	102.757	177.181	165.178
2.6	86.128	129.724	100.211	129.225	108.182	188.444	176.089
2.7	90.101	136.065	105.182	137.311	113.685	200.006	187.332
2.8	94.112	142.479	110.214	145.616	119.265	211.867	198.905
2.9	98.158	148.965	115.306	154.139	124.922	224.024	210.810
3.0	102.240	155.522	120.456	162.880	130.653	236.479	223.047
3.1	106.358	162.148	125.664	171.840	136.459	249.228	235.618
3.2	110.510	168.843	130.929	181.017	142.338	262.273	248.523
3.3	114.696	175.605	136.249	190.412	148.288	275.613	261.763
3.4	118.915	182.434	141.624	200.024	154.310	289.246	275.339
3.5	123.168	189.328	147.054	209.854	160.402	303.172	289.251

*After 2 high pressure impact cycles

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS			SIGMA
			a	b	c	
<u>FORWARD FLOW</u>						
0.0	1008.6	69.8	1.452677	1.131582	0.074869	0.225
5.2*	1010.5	66.5	1.600169	1.208389	0.066215	0.288
5.2	1007.9	59.6	1.480101	1.228221	0.064656	0.342
10.2	1011.5	67.1	1.480590	1.435242	0.204241	0.423
<u>REVERSE FLOW</u>						
5.3	1015.6	76.7	1.505028	1.236988	0.091808	0.332
11.1	1008.2	73.4	1.655076	1.413986	0.193604	1.001
<u>FORWARD FLOW AFTER REVERSE FLOW</u>						
----	1005.3	70.4	1.612601	1.415950	0.264519	0.465

*After 2 high pressure impact cycles

TABLE XXX
TEST NO. 12
TEST SPECIMEN S/N 028

GN₂ IMPACT PRESSURE DATA

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u> <u>(PSIA)</u>	<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u> <u>(PSIA)</u>	<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>	
- APPLIED IN FORWARD (HPOF S/N SIDE UPSTREAM) DIRECTION - AFTER ADDITION OF 5.2 mg OF SYNTHETIC CONTAMINANT				
1	10,790	758.6	10,315	
2	10,700	752.3	725.2	0.956
3	10,660	749.5	10,236	0.957
4	10,740	755.1	10,124	0.950
5	10,840	762.1	10,180	0.948
6	10,710	753.0	714.9	0.938
7	10,770	757.2	10,124	0.945
8	10,700	752.3	10,079	0.936
9	10,770	757.2	10,258	0.959
10	10,720	753.7	708.6	0.947
AFTER ADDITION OF A TOTAL OF 10.2 mg OF SYNTHETIC CONTAMINANT				
11	10,670	750.2	10,449	0.979
12	10,650	748.8	11,270	1.058
13	10,590	744.5	11,310	1.068
14	10,600	749.5	11,197	1.056
15	10,580	743.8	11,077	1.047
16	10,530	740.3	11,020	1.046
17	10,570	743.1	11,107	1.051
18	10,560	742.4	10,940	1.036
19	10,590	744.5	11,116	1.050
20	10,560	742.4	11,050	1.046

<u>IMPACT CYCLE NO.</u>	<u>PRESSURE UPSTREAM OF ISOLATION VALVE</u> <u>(PSIA)</u>	<u>(Kg/cm²)</u>	<u>PEAK IMPACT PRESSURE UPSTREAM OF TEST SPECIMEN</u> <u>(PSIA)</u>	<u>(Kg/cm²)</u>	<u>RATIO OF PEAK IMPACT PRESSURE TO PRESSURE UPSTREAM OF ISOLATION VALVE</u>
<p>-- APPLIED IN REVERSE (HPOF S/N SIDE DOWNSTREAM) SIDE OF TEST SPECIMEN FOLLOWING FORWARD PORTION OF TEST - AFTER ADDITION OF 5.3 mg OF SYNTHETIC CONTAMINANT</p>					
1	10,570	743.1	10,414	732.2	0.985
2	10,690	751.6	10,413	732.1	0.974
3	10,730	754.4	10,424	732.9	0.971
4	10,750	755.8	10,473	736.3	0.974
5	10,820	762.7	10,390	730.5	0.960
6	11,310	795.2	11,020	774.8	0.974
7	11,350	798.0	11,080	779.0	0.976
8	11,120	781.8	10,790	758.6	0.970
9	11,180	786.0	10,860	763.5	0.971
10	10,750	755.8	10,401	731.3	0.967
<p>AFTER ADDITION OF A TOTAL OF 11.1 mg OF SYNTHETIC CONTAMINANT</p>					
11	11,150	783.9	10,777	757.7	0.966
12	11,300	794.5	10,880	764.9	0.963
13	11,400	801.5	10,925	768.1	0.958
14	11,610	816.3	11,052	777.0	0.952
15	11,740	825.4	10,994	773.0	0.936
16	11,760	826.8	11,040	776.2	0.939
17	11,990	843.0	11,189	786.7	0.933
18	12,130	852.8	11,137	783.0	0.918
19	12,160	854.9	11,086	779.4	0.912
20	12,400	871.8	11,349	797.9	0.915

TABLE XXXI Part A
TEST NO. 5
TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)				
	TEST SPECIMEN		INLET PRESSURE (Kg/cm ²)		
	FORWARD FLOW 29.386 ^A	REVERSE FLOW 29.157 ^B	FORWARD FLOW 70.865 ^C	REVERSE FLOW 70.321 ^D	FORWARD FLOW 70.321 ^E
0.5	2.126	1.709	0.437	0.744	0.436
1.0	2.315	3.444	0.914	1.493	0.907
1.5	3.741	5.620	1.435	2.286	1.422
2.0	5.382	8.088	1.992	3.117	1.976
2.5	7.169	11.134	2.582	3.983	2.566
3.0	9.223	15.192	3.202	4.881	3.187
3.5	11.744	20.858	3.850	5.809	3.839
4.0	15.001	28.999	4.522	6.764	4.518
4.5	19.361	-----	5.219	7.746	5.225
5.0	25.339	-----	5.939	8.753	5.956
5.5	-----	-----	6.681	9.783	6.713
6.0	-----	-----	7.444	10.836	7.493

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.364607 + 1.028845 (\text{log Kg GN}_2/\text{hr}) + 1.451526 (\text{log Kg GN}_2/\text{hr})^2$
 $- 3.961803 (\text{log Kg GN}_2/\text{hr})^3 + 4.037911 (\text{log Kg GN}_2/\text{hr})^4$
Sigma = 0.148

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.537006 + 1.195403 (\text{log Kg GN}_2/\text{hr}) + 0.136114 (\text{log Kg GN}_2/\text{hr})^2$
 $- 0.816069 (\text{log Kg GN}_2/\text{hr})^3 + 2.545334 (\text{log Kg GN}_2/\text{hr})^4$
Sigma = 0.188

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.039047 + 1.094718 (\text{log Kg GN}_2/\text{hr}) + 0.097467 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.030

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.114768 + 1.090749 (\text{log Kg GN}_2/\text{hr}) + 0.095083 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.024

E. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.042502 + 1.089679 (\text{log Kg GN}_2/\text{hr}) + 0.114280 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.025

TABLE XXXI Part B
 TEST NO. 5
 TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (liters* GN ₂ /min)	<u>NET DIFFERENTIAL PRESSURE (Kg/cm² Differential)</u>				
	TEST SPECIMEN		INLET PRESSURE (Kg/cm ²)		
	FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW	FORWARD FLOW
	<u>29.386^A</u>	<u>29.157^B</u>	<u>70.865^C</u>	<u>70.321^D</u>	<u>70.321^E</u>
10	1.808	2.268	0.617	1.029	0.617
15	2.420	3.623	0.956	1.559	0.952
20	3.401	5.129	1.317	2.110	1.307
25	4.506	6.751	1.695	2.679	1.683
30	5.677	8.563	2.091	3.267	2.076
35	6.922	10.684	2.502	3.871	2.486
40	8.284	13.262	2.927	4.491	2.911
45	9.824	16.480	3.366	5.126	3.352
50	11.619	20.573	3.819	5.774	3.807
55	13.761	25.848	4.283	6.436	4.275
60	16.363	-----	4.760	7.111	4.757
65	19.571	-----	5.248	7.798	5.252
70	23.565	-----	5.747	8.497	5.759
75	28.583	-----	6.256	9.208	6.279
80	-----	-----	6.777	9.930	6.810
85	-----	-----	7.307	10.663	7.352
90	-----	-----	7.847	11.406	7.906
95	-----	-----	8.397	12.159	8.471
100	-----	-----	8.956	12.923	9.047

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 14.526827 - 43.312338 (\text{log liters GN}_2/\text{min}) + 47.639599 (\text{log liters GN}_2/\text{min})^2 - 22.626927 (\text{log liters GN}_2/\text{min})^3 + 4.029968 (\text{log liters GN}_2/\text{min})^4$
Sigma = 0.156

B. $\text{Log (Kg/cm}^2 \text{ differential)} = + 5.258398 - 18.515594 (\text{log liters GN}_2/\text{min}) - 23.857784 (\text{log liters GN}_2/\text{min})^2 - 12.838087 (\text{log liters GN}_2/\text{min})^3 + 2.593151 (\text{log liters GN}_2/\text{min})^4$
Sigma = 0.184

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.177866 + 0.870999 (\text{log liters GN}_2/\text{min}) + 0.096995 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.029

D. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.010520 + 0.857361 (\text{log liters GN}_2/\text{min}) + 0.099278 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.021

E. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.139701 + 0.811703 (\text{log liters GN}_2/\text{min}) + 0.118199 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.025

TABLE XXXI Part C
 TEST NO. 5
 TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)				
	Forward Flow 418.0 ^A	Reverse Flow 414.7 ^B	Forward Flow 1007.9 ^C	Reverse Flow 1000.2 ^D	Forward Flow 1000.2 ^E
1.0	-----	23.122	5.618	9.620	5.627
1.5	25.586	31.584	8.582	14.349	8.546
2.0	29.993	43.609	11.690	19.211	11.609
2.5	37.803	56.947	14.929	24.201	14.808
3.0	47.106	70.987	18.288	29.314	18.131
3.5	57.173	85.694	21.759	34.544	21.573
4.0	67.688	101.311	25.335	39.884	25.126
4.5	78.566	118.217	29.010	45.330	28.786
5.0	89.860	136.881	32.780	50.877	32.546
5.5	101.711	157.843	36.640	56.521	36.405
6.0	114.321	181.718	40.587	62.258	40.357
6.5	127.934	209.216	44.618	68.086	44.401
7.0	142.831	241.166	48.729	74.001	48.532
7.5	159.332	278.544	52.918	80.001	52.750
8.0	177.800	322.516	57.183	86.083	57.050
8.5	198.647	374.479	61.521	92.244	61.432
9.0	222.350	-----	65.931	98.484	65.893
9.5	249.463	-----	70.412	104.800	70.432
10.0	280.634	-----	74.961	111.190	75.047
10.5	316.626	-----	79.576	117.652	79.737
11.0	358.342	-----	84.257	124.186	84.499
11.5	406.856	-----	89.002	130.789	89.334
12.0	-----	-----	93.811	137.461	94.239
12.5	-----	-----	98.680	144.199	99.213
13.0	-----	-----	103.611	151.003	104.256
13.5	-----	-----	108.601	157.872	109.366
14.0	-----	-----	113.650	164.805	114.543
14.5	-----	-----	118.757	171.800	119.785
15.0	-----	-----	123.921	178.856	125.091

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.55276 - 2.028642 (\log \text{lbs GN}_2/\text{hr}) + 8.403450 (\log \text{lbs GN}_2/\text{hr})^2 - 9.522875 (\log \text{lbs GN}_2/\text{hr})^3 + 4.043446 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 2.089

B. $\text{Log (PSID)} = 1.364017 + 0.398365 (\log \text{lbs GN}_2/\text{hr}) + 2.789279 (\log \text{lbs GN}_2/\text{hr})^2 - 4.329033 (\log \text{lbs GN}_2/\text{hr})^3 + 2.553383 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 2.686

C. $\text{Log (PSID)} = 0.749577 + 1.027894 (\log \text{lbs GN}_2/\text{hr}) + 0.097362 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.424

D. $\text{Log (PSID)} = 0.904944 + 1.024442 (\log \text{lbs GN}_2/\text{hr}) + 0.095647 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.336

E. $\text{Log (PSID)} = 0.750315 + 1.010165 (\log \text{lbs GN}_2/\text{hr}) + 0.114855 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.360

TABLE XXXI Part D
TEST NO. 5
TEST SPECIMEN S/N 025

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)				
	Forward Flow <u>418.0^A</u>	Reverse Flow <u>414.7^B</u>	Forward Flow <u>1007.9^C</u>	Reverse Flow <u>1000.2^D</u>	Forward Flow <u>1000.2^E</u>
0.4	-----	37.039	10.035	16.626	9.980
0.5	32.416	48.073	12.781	20.893	12.689
0.6	39.663	59.845	15.623	25.256	15.496
0.7	47.862	72.107	18.554	29.711	18.397
0.8	56.601	84.875	21.569	34.252	21.387
0.9	65.684	98.314	24.663	38.878	24.461
1.0	75.044	112.666	27.883	43.584	27.615
1.1	84.699	128.225	31.075	48.367	30.847
1.2	94.722	145.328	34.386	53.224	34.154
1.3	105.229	164.350	37.764	58.153	37.533
1.4	116.359	185.715	41.207	63.152	40.982
1.5	128.278	209.903	44.712	68.219	44.500
1.6	141.171	237.463	48.278	73.351	48.084
1.7	155.244	269.031	51.903	78.547	51.732
1.8	170.727	305.344	55.585	83.806	55.444
1.9	187.879	347.268	59.323	89.125	59.218
2.0	206.989	395.818	63.116	94.504	63.052
2.1	228.387	-----	66.963	99.941	66.946
2.2	252.448	-----	70.861	105.434	70.897
2.3	279.605	-----	74.812	110.984	74.906
2.4	310.353	-----	78.812	116.588	78.972
2.5	345.268	-----	82.862	122.246	83.092
2.6	385.017	-----	86.961	127.956	87.267
2.7	-----	-----	91.107	133.719	91.495
2.8	-----	-----	95.300	139.532	95.776
2.9	-----	-----	99.539	145.395	100.110
3.0	-----	-----	103.824	151.308	104.494
3.1	-----	-----	108.154	157.270	108.930
3.2	-----	-----	112.528	163.279	113.415
3.3	-----	-----	116.945	169.335	117.950
3.4	-----	-----	121.406	175.438	122.534
3.5	-----	-----	125.909	181.587	127.166

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.875316 + 1.265789 (\text{log SCFM}) + 0.057545 (\text{log SCFM})^2 + 0.790129 (\text{log SCFM})^3 + 3.996893 (\text{log SCFM})^4$
Sigma = 2.101

B. $\text{Log (PSID)} = 2.051792 + 1.322750 (\text{log SCFM}) + 0.739133 (\text{log SCFM})^2 + 2.185270 (\text{log SCFM})^3 + 2.548147 (\text{log SCFM})^4$
Sigma = 2.699

C. $\text{Log (PSID)} = 1.444556 + 1.152007 (\text{log SCFM}) + 0.097059 (\text{log SCFM})^2$
Sigma = 0.425

D. $\text{Log (PSID)} = 1.597016 + 1.146196 (\text{log SCFM}) + 0.095870 (\text{log SCFM})^2$
Sigma = 0.339

E. $\text{Log (PSID)} = 1.441144 + 1.156511 (\text{log SCFM}) + 0.114886 (\text{log SCFM})^2$
Sigma = 0.359

TABLE XXXII Part A

TEST NO. 5

TEST SPECIMEN S/N 028

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 WITH FLOW IN BOTH THE FORWARD (S/N SIDE UPSTREAM)
 AND REVERSED DIRECTIONS

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	FORWARD 70.914 ^A	REVERSE 70.586 ^B	FORWARD 29.230 ^C	REVERSE 29.425 ^D
0.5	0.449	0.619	0.937	1.161
1.0	0.940	1.236	2.451	3.138
1.5	1.469	1.887	3.920	4.967
2.0	2.029	2.568	5.510	6.945
2.5	2.617	3.277	7.340	9.276
3.0	3.229	4.012	9.499	12.120
3.5	3.864	4.770	12.074	15.633
4.0	4.519	5.551	15.150	19.988
4.5	5.194	6.352	18.824	25.384
5.0	5.887	7.174	23.205	-----
5.5	6.597	8.015	28.413	-----
6.0	7.324	8.873	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.026829 + 1.087518 (\text{log Kg GN}_2/\text{hr}) + 0.074869 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.016

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.092025 + 1.026735 (\text{log Kg GN}_2/\text{hr}) + 0.094315 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.032

C. $\text{Log (Kg/cm}^2 \text{ differential)} = + 0.389276 + 1.193057 (\text{log Kg GN}_2/\text{hr})$
 $- 0.361244 (\text{log Kg GN}_2/\text{hr})^2 + 0.933793 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.179

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.496639 + 1.179090 (\text{log Kg GN}_2/\text{hr})$
 $- 0.478866 (\text{log Kg GN}_2/\text{hr})^2 + 1.227231 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.179

TABLE XXXII Part B
TEST NO. 5
TEST SPECIMEN S/N 028

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
WITH FLOW IN BOTH THE FORWARD (S/N SIDE UPSTREAM)
AND REVERSED DIRECTIONS

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	FORWARD 70.914 ^A	REVERSE 70.586 ^B	FORWARD 29.230 ^C	REVERSE 29.425 ^D
10	0.636	0.856	1.543	1.967
15	0.984	1.291	2.577	3.297
20	1.351	1.742	3.594	4.564
25	1.733	2.208	4.655	5.878
30	2.129	2.689	5.806	7.317
35	2.538	3.182	7.081	8.942
40	2.959	3.688	8.510	10.805
45	3.391	4.206	10.122	12.958
50	3.834	4.735	11.945	15.455
55	4.287	5.275	14.009	18.354
60	4.750	5.825	16.345	21.720
65	5.222	6.385	18.987	25.627
70	5.702	6.955	21.972	-----
75	6.191	7.534	25.341	-----
80	6.688	8.122	29.138	-----
85	7.194	8.719	-----	-----
90	7.707	9.325	-----	-----
95	8.227	9.939	-----	-----
100	8.755	10.561		

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.185558 + 0.914158 (\text{log liters GN}_2/\text{min}) + 0.074869 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.016

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.970265 + 0.808346 (\text{log liters GN}_2/\text{min}) + 0.094315 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.032

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 2.925350 + 5.784554 (\text{log liters GN}_2/\text{min}) - 3.604603 (\text{log liters GN}_2/\text{min})^2 + 0.933803 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.179

D. $\text{Log (Kg/cm}^2 \text{ differential)} = - 3.414647 + 7.222476 (\text{log liters GN}_2/\text{min}) - 4.741104 (\text{log liters GN}_2/\text{min})^2 + 1.227169 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.179

TABLE XXXII Part C

TEST NO. 5
 TEST SPECIMEN S/N 028

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 WITH FLOW IN BOTH THE FORWARD (S/N SIDE UPSTREAM) AND REVERSED DIRECTIONS

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)			
	FORWARD 1008.6 ^A	REVERSE 1004.0 ^B	FORWARD 415.7 ^C	REVERSE 418.5 ^D
1.0	5.776	8.010	11.280	13.763
1.5	8.839	11.911	21.295	27.122
2.0	12.031	15.913	30.981	39.702
2.5	15.338	20.016	40.411	51.618
3.0	18.750	24.215	49.850	63.351
3.5	22.258	28.506	59.534	75.328
4.0	25.856	32.884	69.654	87.883
4.5	29.537	37.346	80.367	101.287
5.0	33.297	41.889	91.809	115.772
5.5	37.132	46.509	104.101	131.552
6.0	41.039	51.204	117.357	148.828
6.5	45.015	55.970	131.689	167.804
7.0	49.057	60.807	147.207	188.687
7.5	53.163	65.711	164.025	211.694
8.0	57.329	70.681	182.260	237.054
8.5	61.556	75.714	202.031	265.014
9.0	65.840	80.811	223.467	295.837
9.5	70.180	85.968	246.701	329.804
10.0	74.575	91.184	271.873	367.223
10.5	79.023	96.459	299.132	408.423
11.0	83.523	101.791	328.635	-----
11.5	88.074	107.178	360.548	-----
12.0	92.675	112.621	395.049	-----
12.5	97.324	118.117	-----	-----
13.0	102.020	123.665	-----	-----
13.5	106.763	129.266	-----	-----
14.0	111.552	134.918	-----	-----
14.5	116.386	140.620	-----	-----
15.0	121.265	146.371	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 0.761617 + 1.036109 (\log \text{lbs GN}_2/\text{hr}) + 0.074869 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.225

B. $\text{Log (PSID)} = 0.903632 + 0.961973 (\log \text{lbs GN}_2/\text{hr}) + 0.094315 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.453

C. $\text{Log (PSID)} = 1.052292 + 1.771314 (\log \text{lbs GN}_2/\text{hr}) - 1.323033 (\log \text{lbs GN}_2/\text{hr})^2$
+ 0.933793 ($\log \text{lbs GN}_2/\text{hr}$)³
Sigma = 2.544

D. $\text{Log (PSID)} = 1.138710 + 1.941879 (\log \text{lbs GN}_2/\text{hr}) - 1.742890 (\log \text{lbs GN}_2/\text{hr})^2$
+ 1.227231 ($\log \text{lbs GN}_2/\text{hr}$)³
Sigma = 2.546

TABLE XXXII Part D
 TEST NO. 5
 TEST SPECIMEN S/N 028

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 WITH FLOW IN BOTH THE FORWARD (S/N SIDE UPSTREAM) AND REVERSED DIRECTIONS

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)			
	FORWARD 1008.6 ^A	REVERSE 1004.0 ^B	FORWARD 415.7 ^C	REVERSE 418.5 ^D
0.4	10.333	13.791	25.922	33.181
0.5	13.147	17.302	34.213	43.817
0.6	16.044	20.887	42.378	54.073
0.7	19.019	24.544	50.590	64.267
0.8	22.066	28.271	58.999	74.666
0.9	25.180	32.063	67.731	85.491
1.0	28.358	35.919	76.890	96.920
1.1	31.597	39.837	86.567	109.113
1.2	34.894	43.814	96.845	122.210
1.3	38.246	47.848	107.801	136.346
1.4	41.652	51.938	119.507	151.655
1.5	45.109	56.082	132.037	168.269
1.6	48.616	60.279	145.464	186.323
1.7	52.170	64.527	159.861	205.961
1.8	55.772	68.824	175.304	227.330
1.9	59.419	73.171	191.871	250.588
2.0	63.111	77.565	209.644	275.902
2.1	66.845	82.005	228.708	303.449
2.2	70.621	86.491	249.151	333.418
2.3	74.439	91.022	271.066	366.013
2.4	78.296	95.597	294.550	401.450
2.5	82.193	100.215	319.706	-----
2.6	86.128	104.875	346.641	-----
2.7	90.101	109.577	375.469	-----
2.8	94.112	114.320	406.308	-----
2.9	98.158	119.103	-----	-----
3.0	102.240	123.926	-----	-----
3.1	106.358	128.787	-----	-----
3.2	110.510	133.688	-----	-----
3.3	114.696	138.626	-----	-----
3.4	118.915	143.602	-----	-----
3.5	123.168	148.615	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3$$

A. $\text{Log (PSID)} = 1.452677 + 1.131582 (\text{log SCFM}) + 0.074869 (\text{log SCFM})^2$

Sigma = 0.225

B. $\text{Log (PSID)} = 1.555329 + 1.082244 (\text{log SCFM}) + 0.094315 (\text{log SCFM})^2$

Sigma = 0.453

C. $\text{Log (PSID)} = 1.885870 + 1.223040 (\text{log SCFM}) + 0.463133 (\text{log SCFM})^2 + 0.933793 (\text{log SCFM})^3$

Sigma = 2.544

D. $\text{Log (PSID)} = 1.986415 + 1.216080 (\text{log SCFM}) + 0.604566 (\text{log SCFM})^2 + 1.227231 (\text{log SCFM})^3$

Sigma = 2.546

TABLE XXXIII Part A

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 29.177 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)				
	BEFORE PROOF TEST FORWARD FLOW	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (703.07 Kg/cm ² NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
TEST SPECIMEN INLET PRESSURE (Kg/cm ²)					
	29.610 ^A	28.966 ^B	29.323 ^C	28.884 ^D	29.108 ^E
0.5	1.966	0.735	-----	0.487	1.120
1.0	4.350	2.109	3.793	1.136	1.939
1.5	6.908	3.397	6.150	1.827	3.121
2.0	10.076	4.749	8.876	2.575	4.419
2.5	14.156	6.287	11.958	3.391	5.818
3.0	19.450	8.101	16.148	4.283	7.364
3.5	-----	10.275	22.745	5.257	9.126
4.0	-----	12.895	-----	6.319	11.183
4.5	-----	-----	-----	7.476	13.632
5.0	-----	-----	-----	8.732	16.585
5.5	-----	-----	-----	10.094	20.181
6.0	-----	-----	-----	11.566	24.590

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.638519 + 1.091342 (\log \text{Kg GN}_2/\text{hr}) + 0.109010 (\log \text{Kg GN}_2/\text{hr})^2 + 0.965732 (\log \text{Kg GN}_2/\text{hr})^3$

Sigma = 0.140

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.324098 + 1.242698 (\log \text{Kg GN}_2/\text{hr}) - 0.581526 (\log \text{Kg GN}_2/\text{hr})^2 + 1.140665 (\log \text{Kg GN}_2/\text{hr})^3$

Sigma = 0.233

C. $\text{Log (Kg/cm}^2 \text{ differential)} = + 0.578971 + 0.920769 (\log \text{Kg GN}_2/\text{hr}) + 2.835641 (\log \text{Kg GN}_2/\text{hr})^2 - 9.206425 (\log \text{Kg GN}_2/\text{hr})^3$
 $+ 10.502686 (\log \text{Kg GN}_2/\text{hr})^4$

Sigma = 0.211

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.055194 + 1.175973 (\log \text{Kg GN}_2/\text{hr}) - 0.067998 (\log \text{Kg GN}_2/\text{hr})^2 + 0.284555 (\log \text{Kg GN}_2/\text{hr})^3$

Sigma = 0.027

E. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.287511 + 1.120023 (\log \text{Kg GN}_2/\text{hr}) + 0.511273 (\log \text{Kg GN}_2/\text{hr})^2 - 1.431530 (\log \text{Kg GN}_2/\text{hr})^3$
 $+ 1.627250 (\log \text{Kg GN}_2/\text{hr})^4$

Sigma = 0.136

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TABLE XXXIII Part B

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 29.177 Kg/cm²

FLOW RATE (liters* GN ₂ /min)	<u>NET DIFFERENTIAL PRESSURE (Kg/cm² Differential)</u>				
	BEFORE PROOF TEST FORWARD FLOW	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (703.07 Kg/cm ² NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
		TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)		
	29.610 ^A	28.966 ^B	29.323 ^C	28.884 ^D	29.108 ^E
10	3.064	1.292	3.581	0.737	1.358
15	4.633	2.222	3.947	1.195	2.033
20	6.381	3.113	5.570	1.673	2.850
25	8.419	4.023	7.430	2.177	3.729
30	10.827	4.996	9.370	2.712	4.654
35	13.685	6.069	11.511	3.280	5.629
40	17.070	7.271	14.115	3.884	6.669
45	21.071	8.629	17.558	4.527	7.798
50	25.783	10.171	22.377	5.210	9.039
55	-----	11.925	-----	5.936	10.421
60	-----	13.922	-----	6.707	11.975
65	-----	16.195	-----	7.524	13.736
70	-----	18.782	-----	8.390	15.744
75	-----	21.721	-----	9.306	18.046
80	-----	25.057	-----	10.275	20.694
85	-----	28.841	-----	11.298	23.750
90	-----	-----	-----	12.376	27.285
95	-----	-----	-----	13.513	-----
100	-----	-----	-----	14.710	-----

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{liters GN}_2/\text{min}) + c (\log \text{liters GN}_2/\text{min})^2 + d (\log \text{liters GN}_2/\text{min})^3 + e (\log \text{liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.211933 + 3.076583 (\log \text{liters GN}_2/\text{min}) - 2.059819 (\log \text{liters GN}_2/\text{min})^2 + 0.681454 (\log \text{liters GN}_2/\text{min})^3$
Sigma = 0.153

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 3.581980 + 7.007782 (\log \text{liters GN}_2/\text{min}) - 4.430427 (\log \text{liters GN}_2/\text{min})^2 + 1.115758 (\log \text{liters GN}_2/\text{min})^3$
Sigma = 0.240

C. $\text{Log (Kg/cm}^2 \text{ differential)} = + 37.731381 - 111.393256 (\log \text{liters GN}_2/\text{min}) + 122.962951 (\log \text{liters GN}_2/\text{min})^2 - 59.540764 (\log \text{liters GN}_2/\text{min})^3 + 10.793746 (\log \text{liters GN}_2/\text{min})^4$
Sigma = 0.203

D. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.840196 + 2.484852 (\log \text{liters GN}_2/\text{min}) - 1.063389 (\log \text{liters GN}_2/\text{min})^2 + 0.286457 (\log \text{liters GN}_2/\text{min})^3$
Sigma = 0.028

E. $\text{Log (Kg/cm}^2 \text{ differential)} = 5.137023 - 16.770278 (\log \text{liters GN}_2/\text{min}) + 19.416605 (\log \text{liters GN}_2/\text{min})^2 - 9.338116 (\log \text{liters GN}_2/\text{min})^3 + 1.687508 (\log \text{liters GN}_2/\text{min})^4$
Sigma = 0.134

TABLE XXXIII Part C

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 415 PSIA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)				
	BEFORE PROOF TEST FORWARD FLOW	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
		TEST SPECIMEN	INLET PRESSURE (PSIA)		
421.2 ^A	421.2 ^A	412.0 ^B	417.1 ^C	410.8 ^D	414.0 ^E
1.5	40.491	22.713	-----	10.200	18.847
2.0	55.656	27.331	49.986	14.403	24.782
2.5	71.070	34.326	61.569	18.721	31.842
3.0	87.475	42.455	77.136	23.175	39.503
3.5	105.404	51.227	94.110	27.785	47.536
4.0	125.296	60.426	111.586	32.569	55.850
4.5	147.541	69.984	129.563	37.542	64.429
5.0	172.523	79.919	148.592	42.716	73.303
5.5	200.633	90.307	169.577	48.101	82.530
6.0	232.279	101.261	193.691	53.709	92.182
6.5	267.901	112.919	222.382	59.547	102.344
7.0	307.972	125.440	257.455	65.625	113.112
7.5	353.006	139.003	301.220	71.951	124.586
8.0	403.563	153.805	356.713	78.533	136.875
8.5	-----	170.067	-----	85.378	150.095
9.0	-----	188.032	-----	92.494	164.373
9.5	-----	207.974	-----	99.889	179.844
10.0	-----	230.201	-----	107.569	196.654
10.5	-----	255.062	-----	115.542	214.964
11.0	-----	282.950	-----	123.815	234.948
11.5	-----	314.317	-----	132.397	256.799
12.0	-----	349.678	-----	141.293	280.726
12.5	-----	389.622	-----	150.512	306.962
13.0	-----	-----	-----	160.060	335.762
13.5	-----	-----	-----	169.946	367.410
14.0	-----	-----	-----	180.176	402.218
14.5	-----	-----	-----	190.759	-----
15.0	-----	-----	-----	201.703	-----

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.389733 + 1.363379 (\log \text{lbs GN}_2/\text{hr}) - 0.895227 (\log \text{lbs GN}_2/\text{hr})^2 + 0.970825 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 1.995

B. $\text{Log (PSID)} = 1.423241 - 1.267011 (\log \text{lbs GN}_2/\text{hr}) + 6.129034 (\log \text{lbs GN}_2/\text{hr})^2 - 6.742505 (\log \text{lbs GN}_2/\text{hr})^3$
+ 2.819419 $(\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 2.453

C. $\text{Log (PSID)} = 2.265497 - 5.957336 (\log \text{lbs GN}_2/\text{hr}) + 19.677023 (\log \text{lbs GN}_2/\text{hr})^2 - 23.549120 (\log \text{lbs GN}_2/\text{hr})^3$
+ 10.469036 $(\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 3.013

D. $\text{Log (PSID)} = 0.785560 + 1.320925 (\log \text{lbs GN}_2/\text{hr}) - 0.358435 (\log \text{lbs GN}_2/\text{hr})^2 + 0.283636 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.388

E. $\text{Log (PSID)} = 1.195838 + 0.005346 (\log \text{lbs GN}_2/\text{hr}) + 3.123466 (\log \text{lbs GN}_2/\text{hr})^2 - 3.654563 (\log \text{lbs GN}_2/\text{hr})^3$
+ 1.623616 $(\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 1.925

TABLE XXXIII Part D

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 415 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)				
	BEFORE PROOF TEST	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	FORWARD FLOW	REVERSE FLOW	FORWARD FLOW
	TEST	SPECIMEN	INLET PRESSURE (PSIA)		
0.4	421.2 ^A	412.0 ^B	417.1 ^C	410.8 ^D	414.0 ^E
0.5	47.724	24.402	47.717	12.166	21.500
0.6	60.865	29.512	53.206	15.853	27.112
0.7	74.417	35.942	64.626	19.631	33.404
0.8	88.813	43.111	78.437	23.516	40.106
0.9	104.391	50.739	93.196	27.521	47.083
1.0	121.434	58.691	108.326	31.655	54.275
1.1	140.199	66.914	123.777	35.931	61.666
1.2	160.936	75.410	139.840	40.354	69.271
1.3	183.897	84.216	157.036	44.934	77.118
1.4	209.343	93.395	176.047	49.677	85.252
1.5	237.548	103.028	197.705	54.590	93.724
1.6	268.804	113.209	223.008	59.678	102.590
1.7	303.421	124.042	253.167	64.946	111.913
1.8	341.735	135.645	289.684	70.401	121.759
1.9	384.105	148.145	334.456	76.047	132.199
2.0	-----	161.679	389.927	81.889	143.308
2.1	-----	176.401	-----	87.933	155.166
2.2	-----	192.478	-----	94.184	167.858
2.3	-----	210.095	-----	100.645	181.475
2.4	-----	229.457	-----	107.323	196.116
2.5	-----	250.793	-----	114.221	211.885
2.6	-----	274.356	-----	121.344	228.898
2.7	-----	300.433	-----	128.698	247.278
2.8	-----	329.343	-----	136.288	267.159
2.9	-----	361.447	-----	144.117	288.687
3.0	-----	397.150	-----	152.190	312.020
3.1	-----	-----	-----	160.514	337.332
3.2	-----	-----	-----	169.092	364.811
3.3	-----	-----	-----	177.929	394.664
3.4	-----	-----	-----	187.031	-----
3.5	-----	-----	-----	196.402	-----
				206.048	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 2.146744 + 1.405828 (\text{log SCFM}) + 0.962659 (\text{log SCFM})^2 + 0.0968242 (\text{log SCFM})^3$
Sigma = 2.040

B. $\text{Log (PSID)} = 1.825518 + 1.248682 (\text{log SCFM}) + 0.106567 (\text{log SCFM})^2 + 0.453008 (\text{log SCFM})^3 + 2.810328 (\text{log SCFM})^4$
Sigma = 2.484

C. $\text{Log (PSID)} = 2.092640 + 1.267307 (\text{log SCFM}) + 0.162886 (\text{log SCFM})^2 + 3.173207 (\text{log SCFM})^3 + 10.548218 (\text{log SCFM})^4$
Sigma = 2.961

D. $\text{Log (PSID)} = 1.555464 + 1.210146 (\text{log SCFM}) + 0.183902 (\text{log SCFM})^2 + 0.283552 (\text{log SCFM})^3$
Sigma = 0.398

E. $(\text{log (PSID)}) = 1.790048 + 1.21562 (\text{log SCFM}) + 0.092756 (\text{log SCFM})^2 + 0.476022 (\text{log SCFM})^3 + 1.647252 (\text{log SCFM})^4$
Sigma = 1.942

TABLE XXXIV Part A

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 70.307 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)				
	BEFORE PROOF TEST FORWARD FLOW	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (703.07 Kg/cm ² NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)			
0.5	70.921 ^A	71.270 ^B	70.600 ^C	70.593 ^D	71.214 ^E
1.0	1.711	0.860	1.302	0.457	0.757
1.5	2.607	1.348	2.041	0.722	1.187
2.0	3.549	1.869	2.830	1.009	1.640
2.5	4.536	2.420	3.663	1.316	2.111
3.0	5.564	3.000	4.538	1.638	2.598
3.5	6.631	3.604	5.449	1.975	3.099
4.0	7.734	4.235	6.396	2.324	3.613
4.5	8.871	4.888	7.376	2.685	4.140
5.0	10.042	5.564	8.387	3.055	4.677
5.5	11.245	6.262	9.428	3.434	5.224
6.0	12.478	6.980	10.498	3.822	5.781

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NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.233329 + 1.016985 (\text{log Kg GN}_2/\text{hr}) + 0.117993 (\text{log Kg GN}_2/\text{hr})^2$

Sigma = 0.043

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.065379 + 1.091733 (\text{log Kg GN}_2/\text{hr}) + 0.088298 (\text{log Kg GN}_2/\text{hr})^2 + 0.013292 (\text{log Kg GN}_2/\text{hr})^3$

Sigma = 0.023

C. $\text{Log (Kg/cm}^2 \text{ differential)} = + 0.174087 + 1.033775 (\text{log Kg GN}_2/\text{hr}) + 0.093075 (\text{log Kg GN}_2/\text{hr})^2$

Sigma = 0.029

D. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.339766 + 1.099285 (\text{log Kg GN}_2/\text{hr}) + 0.162690 (\text{log Kg GN}_2/\text{hr})^2 - 0.067646 (\text{log Kg GN}_2/\text{hr})^3$

Sigma = 0.008

E. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.121004 + 1.103497 (\text{log Kg GN}_2/\text{hr}) + 0.040168 (\text{log Kg GN}_2/\text{hr})^2$

Sigma = 0.024

TABLE XXXIV Part B

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 70.307 Kg/cm²

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)				
	BEFORE PROOF TEST FORWARD FLOW	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (703.07 Kg/cm ² NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
		TEST	SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	70.921 ^A	71.270 ^B	70.600 ^C	70.593 ^D	71.214 ^E
10	1.215	0.579	0.883	0.326	0.510
15	1.811	0.899	1.365	0.500	0.794
20	2.428	1.237	1.875	0.687	1.091
25	3.064	1.592	2.410	0.884	1.400
30	3.719	1.961	2.968	1.090	1.719
35	4.392	2.345	3.548	1.304	2.046
40	5.082	2.742	4.148	1.525	2.381
45	5.788	3.153	4.767	1.752	2.724
50	6.510	3.575	5.404	1.985	3.074
55	7.248	4.010	6.058	2.224	3.430
60	8.000	4.456	6.728	2.467	3.792
65	8.766	4.914	7.415	2.715	4.160
70	9.546	5.383	8.117	2.967	4.533
75	10.340	5.862	8.833	3.223	4.912
80	11.146	6.352	9.565	3.483	5.296
85	11.965	6.853	10.310	3.746	5.684
90	12.797	7.363	11.069	4.013	6.077
95	13.641	7.884	11.842	4.282	6.475
100	14.497	8.414	12.627	4.555	6.877

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.767541 + 0.740120 (\text{log liters GN}_2/\text{min}) + 0.112142 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.037

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.260923 + 0.994617 (\text{log liters GN}_2/\text{min}) + 0.008834 (\text{log liters GN}_2/\text{min})^2$

$$+ 0.020169 (\text{log liters GN}_2/\text{min})^3$$

Sigma = 0.023

C. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.905604 + 0.827545 (\text{log liters GN}_2/\text{min}) + 0.090469 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.039

D. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.271580 + 0.481456 (\text{log liters GN}_2/\text{min}) + 0.364979 (\text{log liters GN}_2/\text{min})^2$

$$- 0.061599 (\text{log liters GN}_2/\text{min})^3$$

Sigma = 0.008

E. $\text{Log (Kg/cm}^2 \text{ differential)} = - 1.332813 + 0.994871 (\text{log liters GN}_2/\text{min}) + 0.045115 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.024

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TABLE XXXIV Part C

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 1000 PSIA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)				
	BEFORE PROOF TEST	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
TEST SPECIMEN	INLET PRESSURE (PSIA)				
	1008.7 ^A	1013.7 ^B	1004.2 ^C	1004.1 ^D	1012.9 ^E
1.5	16.577	8.079	12.255	4.306	7.060
2.0	22.054	11.004	16.672	5.847	9.672
2.5	27.683	14.044	21.269	7.477	12.372
3.0	33.458	17.191	26.032	9.185	15.149
3.5	39.376	20.438	30.947	10.963	17.994
4.0	45.432	23.782	36.007	12.805	20.902
4.5	51.620	27.216	41.203	14.706	23.866
5.0	57.936	30.738	46.529	16.662	26.884
5.5	64.375	34.344	51.979	18.668	29.951
6.0	70.935	38.032	57.548	20.721	33.065
6.5	77.611	41.798	63.231	22.819	36.224
7.0	84.400	45.641	69.025	24.958	39.425
7.5	91.299	49.559	74.926	27.137	42.666
8.0	98.306	53.549	80.931	29.353	45.945
8.5	105.418	57.611	87.037	31.605	49.262
9.0	112.633	61.742	93.240	33.890	52.614
9.5	119.949	65.941	99.540	36.207	56.000
10.0	127.363	70.207	105.933	38.554	59.420
10.5	134.873	74.538	112.418	40.931	62.872
11.0	142.479	78.935	118.992	43.336	66.355
11.5	150.178	83.394	125.654	45.767	69.868
12.0	157.969	87.916	132.402	48.225	73.411
12.5	165.850	92.500	139.235	50.706	76.982
13.0	173.820	97.145	146.150	53.212	80.582
13.5	181.878	101.849	153.147	55.740	84.208
14.0	190.021	106.613	160.224	58.290	87.862
14.5	198.250	111.435	167.380	60.862	91.541
15.0	206.563	116.315	174.614	63.454	95.246

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log lbs GN}_2/\text{hr}) + c (\text{log lbs GN}_2/\text{hr})^2 + d (\text{log lbs GN}_2/\text{hr})^3 + e (\text{log lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.050982 + 0.936239 (\text{log lbs GN}_2/\text{hr}) + 0.117821 (\text{log lbs GN}_2/\text{hr})^2$

Sigma = 0.613

B. $(\text{log (PSID)}) = 0.722549 + 1.035478 (\text{log lbs GN}_2/\text{hr}) + 0.074861 (\text{log lbs GN}_2/\text{hr})^2 + 0.012991 (\text{log lbs GN}_2/\text{hr})^3$

Sigma = 0.328

C. $\text{Log (PSID)} = 0.983154 + 0.969867 (\text{log lbs GN}_2/\text{hr}) + 0.093044 (\text{log lbs GN}_2/\text{hr})^2$

Sigma = 0.416

D. $\text{Log (PSID)} = 0.457186 + 0.966088 (\text{log lbs GN}_2/\text{hr}) + 0.228988 (\text{log lbs GN}_2/\text{hr})^2 - 0.066188 (\text{log lbs GN}_2/\text{hr})^3$

Sigma = 0.118

E. $\text{Log (PSID)} = 0.658274 + 1.074821 (\text{log lbs GN}_2/\text{hr}) + 0.040836 (\text{log lbs GN}_2/\text{hr})^2$

Sigma = 0.343

TABLE XXXIV Part D

TEST NO. 5

TEST SPECIMEN S/N 023

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
AT A NOMINAL INLET PRESSURE OF 1000 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)				
	BEFORE PROOF TEST	AFTER PROOF TEST		AFTER 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN ₂ IMPACT CYCLES	
		FORWARD FLOW	REVERSE FLOW	FORWARD FLOW	REVERSE FLOW
TEST SPECIMEN INLET PRESSURE (PSIA)					
1008.7 ^A	1013.7 ^B	1004.2 ^C	1004.1 ^D	1012.9 ^E	
0.4	19.145	9.443	14.325	5.027	8.284
0.5	23.954	12.027	18.225	6.395	10.585
0.6	28.876	14.694	22.256	7.827	12.950
0.7	33.909	17.440	26.410	9.318	15.370
0.8	39.049	20.261	30.679	10.862	17.841
0.9	44.292	23.153	35.057	12.455	20.360
1.0	49.636	26.115	39.538	14.093	22.922
1.1	55.078	29.143	44.119	15.773	25.525
1.2	60.614	32.235	48.795	17.493	28.166
1.3	66.242	35.390	53.563	19.250	30.844
1.4	71.959	38.605	58.419	21.042	33.557
1.5	77.764	41.880	63.361	22.867	36.302
1.6	83.654	45.212	68.387	24.723	39.079
1.7	89.628	48.601	73.493	26.610	41.887
1.8	95.683	52.046	78.678	23.525	44.724
1.9	101.818	55.545	83.941	30.467	47.589
2.0	108.031	59.097	89.278	32.434	50.481
2.1	114.321	62.701	94.688	34.427	53.400
2.2	120.686	66.357	100.171	36.443	56.344
2.3	127.126	70.064	105.723	38.482	59.313
2.4	133.639	73.821	111.345	40.542	62.306
2.5	140.223	77.627	117.035	42.624	65.323
2.6	146.878	81.482	122.791	44.726	68.363
2.7	153.603	85.384	128.612	46.847	71.425
2.8	160.396	89.334	134.498	48.987	74.510
2.9	167.257	93.331	140.447	51.145	77.615
3.0	174.185	97.375	146.459	53.320	80.741
3.1	181.178	101.464	152.531	55.512	83.888
3.2	188.237	105.598	158.665	57.721	87.055
3.3	195.360	109.777	164.858	59.945	90.241
3.4	202.547	114.001	171.110	62.184	93.447
3.5	209.797	118.269	177.420	64.438	96.672

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.695798 + 1.086543 (\text{log SCFM}) + 0.117723 (\text{log SCFM})^2$

Sigma = 0.607

B. $\text{Log (PSID)} = 1.416887 + 1.146886 (\text{log SCFM}) + 0.099048 (\text{log SCFM})^2 + 0.016641 (\text{log SCFM})^3$

Sigma = 0.325

C. $\text{Log (PSID)} = 1.639323 + 1.088671 (\text{log SCFM}) + 0.092738 (\text{log SCFM})^2$

Sigma = 0.417

D. $\text{Log (PSID)} = 1.148991 + 1.177661 (\text{log SCFM}) + 0.104049 (\text{log SCFM})^2 - 0.070637 (\text{log SCFM})^3$

Sigma = 0.117

E. $\text{Log (PSID)} = 1.360252 + 1.126830 (\text{log SCFM}) + 0.040453 (\text{log SCFM})^2$

Sigma = 0.344

TABLE XXXV Part A

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

Prior to Impact Data

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	29.254 ^A	49.281 ^B
0.5		2.057	1.093
1.0		4.399	2.314
1.5		6.993	3.567
2.0		10.211	4.887
2.5		14.312	6.289
3.0		19.553	7.785
3.5		26.224	9.381
4.0	-----		11.085
4.5	-----		12.901
5.0	-----		14.833
5.5	-----		16.887
6.0	-----		19.065

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.643403 + 1.084085 (\text{log Kg GN}_2/\text{hr}) + 0.195607 (\text{log Kg GN}_2/\text{hr})^2 + 0.792200 (\text{log Kg GN}_2/\text{hr})^3$
Sigma + 0.149

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.364406 + 1.062489 (\text{log Kg GN}_2/\text{hr}) - 0.007234 (\text{log Kg GN}_2/\text{hr})^2 + 0.198300 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.047

C. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.220091 + 1.009544 (\text{log Kg GN}_2/\text{hr}) + 0.136121 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.035

TABLE XXXV Part B

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

Prior to Impact Data

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	TEST SPECIMEN	INLET PRESSURE	(Kg/cm ²)	
		29.254 ^A	49.281 ^B	70.740 ^C
10		3.115	1.628	1.186
15		4.706	2.471	1.762
20		6.460	3.333	2.359
25		8.504	4.223	2.977
30		10.933	5.147	3.614
35		13.836	6.108	4.270
40		17.305	7.110	4.944
45		21.441	8.153	5.636
50		26.358	9.239	6.344
55		-----	10.370	7.069
60		-----	11.546	7.809
65		-----	12.768	8.565
70		-----	14.038	9.335
75		-----	15.356	10.120
80		-----	16.723	10.918
85		-----	18.140	11.731
90		-----	19.608	12.556
95		-----	21.127	13.395
100		-----	22.698	14.247

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.412402 + 3.592114 (\text{log liters GN}_2/\text{min}) - 2.478313 (\text{log liters GN}_2/\text{min})^2 + 0.792008 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.232

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.007939 + 1.557547 (\text{log liters GN}_2/\text{min}) - 0.488360 (\text{log liters GN}_2/\text{min})^2 + 0.150283 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.049

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.755153 + 0.704066 (\text{log liters GN}_2/\text{min}) + 0.125189 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.034

TABLE XXXV Part C

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

Prior To Impact Data

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)	416.1 ^A	700.9 ^B
1.0		26.083	13.938
1.5		41.407	21.817
2.0		56.336	29.685
2.5		71.815	37.626
3.0		88.463	45.700
3.5		106.725	53.950
4.0		126.968	62.407
4.5		149.525	71.094
5.0		174.720	80.029
5.5		202.885	89.226
6.0		234.364	98.697
6.5		269.521	108.453
7.0		308.744	118.504
7.5		352.452	128.856
8.0		401.091	139.519
8.5		-----	150.499
9.0		-----	161.803
9.5		-----	173.437
10.0		-----	185.407
10.5		-----	197.720
11.0		-----	210.381
11.5		-----	223.395
12.0		-----	236.769
12.5		-----	250.508
13.0		-----	264.617
13.5		-----	279.102
14.0		-----	293.969
14.5		-----	309.222
15.0		-----	324.867
			203.291

NOTE: Data values obtained from lease square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 1.416352 + 1.222198 (\log \text{lbs GN}_2/\text{hr}) - 0.605237 (\log \text{lbs GN}_2/\text{hr})^2 + 0.783060 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 2.116

B. $\text{Log (PSID)} = 1.144190 + 1.136008 (\log \text{lbs GN}_2/\text{hr}) - 0.209811 (\log \text{lbs GN}_2/\text{hr})^2 + 0.197740 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.684

C. $\text{Log (PSID)} = 1.042060 + 0.917266 (\log \text{lbs GN}_2/\text{hr}) + 0.135390 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.501

TABLE XXXV Part D

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

Prior To Impact Data

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	416.1 ^A	700.9 ^B	1006.2 ^C
0.4	48.435	25.502	18.609
0.5	61.520	32.364	23.236
0.6	75.195	39.295	27.979
0.7	89.824	46.331	32.838
0.8	105.690	53.499	37.809
0.9	123.033	60.820	42.890
1.0	142.073	68.310	48.077
1.1	163.024	75.981	53.368
1.2	186.101	83.844	58.760
1.3	211.526	91.908	64.250
1.4	239.528	100.182	69.837
1.5	270.352	108.670	75.518
1.6	304.254	117.381	81.291
1.7	341.508	126.319	87.154
1.8	382.407	135.490	93.106
1.9	-----	144.899	99.144
2.0	-----	154.550	105.268
2.1	-----	164.448	111.475
2.2	-----	174.596	117.766
2.3	-----	185.000	124.137
2.4	-----	195.663	130.589
2.5	-----	206.588	137.119
2.6	-----	217.781	143.727
2.7	-----	229.244	150.412
2.8	-----	240.982	157.173
2.9	-----	252.998	164.009
3.0	-----	265.296	170.918
3.1	-----	277.880	177.901
3.2	-----	290.753	184.956
3.3	-----	303.919	192.083
3.4	-----	317.381	199.280
3.5	-----	331.144	206.548

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3$$

A. $\text{Log (PSID)} = 2.152511 + 1.404914 (\text{log SCFM}) + 0.893650 (\text{log SCFM})^2 + 0.790199 (\text{log SCFM})^3$
Sigma = 2.095

B. $\text{Log (PSID)} = 1.834482 + 1.109429 (\text{log SCFM}) + 0.166458 (\text{log SCFM})^2 + 0.202773 (\text{log SCFM})^3$
Sigma = 0.676

C. $\text{Log (PSID)} = 1.681937 + 1.089817 (\text{log SCFM}) + 0.135634 (\text{log SCFM})^2$
Sigma = 0.503

TABLE XXXVI Part A
 TEST NO. 5
 TEST SPECIMEN S/N 024
 CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 DATA AFTER 80 HIGH PRESSURE (703.07 Kg/cm² NOMINAL) GN₂ IMPACTS

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.343 ^A	49.433 ^B	70.837 ^C
0.5	2.023	0.601	0.483
1.0	2.158	1.273	0.946
1.5	3.346	1.935	1.429
2.0	4.716	2.611	1.932
2.5	6.173	3.313	2.454
3.0	7.758	4.049	2.992
3.5	9.557	4.823	3.547
4.0	11.686	5.650	4.117
4.5	14.285	6.501	4.702
5.0	17.529	7.410	5.300
5.5	21.643	8.368	5.912
6.0	26.922	9.378	6.537

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.333983 + 0.914813 (\log \text{Kg GN}_2/\text{hr}) + 1.450049 (\log \text{Kg GN}_2/\text{hr})^2 - 3.356703 (\log \text{Kg GN}_2/\text{hr})^3 + 2.966974 (\log \text{Kg GN}_2/\text{hr})^4$
Sigma = 0.132

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.104923 + 1.039567 (\log \text{Kg GN}_2/\text{hr}) - 0.079457 (\log \text{Kg GN}_2/\text{hr})^2 + 0.225707 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.052

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.024038 + 0.999302 (\log \text{Kg GN}_2/\text{hr}) + 0.102065 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.037

TABLE XXXVI Part B

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

DATA AFTER 80 HIGH PRESSURE (703.07 Kg/cm² NOMINAL) GN₂ IMPACTS

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.343 ^A	49.433 ^B	70.837 ^C
10	1.792	0.903	0.684
15	2.286	1.360	1.009
20	3.101	1.816	1.342
25	4.022	2.278	1.682
30	4.991	2.748	2.030
35	5.995	3.231	2.384
40	7.048	3.728	2.746
45	8.174	4.239	3.114
50	9.403	4.766	3.489
55	10.770	5.310	3.869
60	12.317	5.872	4.256
65	14.088	6.451	4.649
70	16.138	7.048	5.047
75	18.529	7.664	5.450
80	21.336	8.299	5.859
85	24.647	8.953	6.273
90	28.571	9.628	6.723
95	-----	10.322	7.116
100	-----	11.036	7.545

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^4$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 11.632920 - 33.789530 (\text{log liters GN}_2/\text{min}) + 36.182736 (\text{log liters GN}_2/\text{min})^2 - 16.646127 (\text{log liters GN}_2/\text{min})^3 + 2.873332 (\text{log liters GN}_2/\text{min})^4$
Sigma = 0.131

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.330455 + 1.711651 (\text{log liters GN}_2/\text{min}) - 0.588602 (\text{log liters GN}_2/\text{min})^2 + 0.163049 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.052

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.008060 + 0.742811 (\text{log liters GN}_2/\text{min}) + 0.100021 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.039

TABLE XXXVI Part C

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

DATA AFTER 80 HIGH PRESSURE (10,000 PSIA NOMINAL) GN₂ IMPACTS

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
	417.4 ^A	703.1 ^B	1007.5 ^C
1.0	33.235	7.627	6.269
1.5	24.708	12.043	9.211
2.0	28.265	16.360	12.207
2.5	34.737	20.630	15.264
3.0	42.487	24.896	18.382
3.5	50.900	29.190	21.559
4.0	59.689	33.534	24.793
4.5	68.736	37.945	28.082
5.0	78.019	42.436	31.425
5.5	87.581	47.018	34.820
6.0	97.504	51.698	38.265
6.5	107.894	56.484	41.760
7.0	118.877	61.382	45.301
7.5	130.595	66.397	48.889
8.0	143.200	71.534	52.522
8.5	156.863	76.796	56.198
9.0	171.768	82.187	59.918
9.5	188.118	87.711	63.679
10.0	206.137	93.372	67.482
10.5	226.075	99.172	71.325
11.0	248.215	105.113	75.207
11.5	272.869	111.200	79.128
12.0	300.396	117.435	83.087
12.5	331.200	123.820	87.083
13.0	365.739	130.357	91.117
13.5	404.537	137.051	95.186
14.0	-----	143.902	99.291
14.5	-----	150.913	103.430
15.0	-----	158.088	107.605

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

A. $\text{Log (PSID)} = 1.521591 - 1.751523 (\log \text{lbs GN}_2/\text{hr}) + 7.011529 (\log \text{lbs GN}_2/\text{hr})^2 - 7.435352 (\log \text{lbs GN}_2/\text{hr})^3 + 2.967910 (\log \text{lbs GN}_2/\text{hr})^4$
Sigma = 1.874

B. $\text{Log (PSID)} = 0.882374 + 1.174645 (\log \text{lbs GN}_2/\text{hr}) - 0.313020 (\log \text{lbs GN}_2/\text{hr})^2 + 0.226217 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.739

C. $\text{Log (PSID)} = 0.797231 (\log \text{lbs GN}_2/\text{hr}) + 0.930919 (\log \text{lbs GN}_2/\text{hr})^2 + 0.101038 (\log \text{lbs GN}_2/\text{hr})^3$
Sigma = 0.526

TABLE XXXVI Part D

TEST NO. 5

TEST SPECIMEN S/N 024

CLEAN CONDITION - IMPACT/FLOW RATE VERSUS DIFFERENTIAL PRESSURE

DATA AFTER 80 HIGH PRESSURE (10,000 PSIA NOMINAL) GN2 IMPACTS

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN	INLET PRESSURE (PSIA)	
0.4	417.4 ^A	703.1 ^B	1007.5 ^C
0.5	25.829	14.098	10.613
0.6	30.263	17.823	13.237
0.7	36.276	21.525	15.906
0.8	43.116	25.230	18.621
0.9	50.429	28.958	21.380
1.0	58.032	32.722	24.183
1.1	65.836	36.535	27.027
1.2	73.816	40.406	29.912
1.3	81.986	44.342	32.837
1.4	90.388	48.349	35.801
1.5	99.081	52.432	38.802
1.6	108.140	56.595	41.839
1.7	117.647	60.843	44.912
1.8	127.694	65.179	48.020
1.9	138.382	69.606	51.162
2.0	149.817	74.126	54.338
2.1	162.115	78.742	57.546
2.2	175.404	83.457	60.785
2.3	189.818	88.273	64.057
2.4	205.510	93.191	67.359
2.5	222.642	98.215	70.691
2.6	241.397	103.345	74.053
2.7	261.975	108.585	77.444
2.8	284.601	113.934	80.864
2.9	309.523	119.396	84.313
3.0	337.018	124.972	87.789
3.1	367.398	130.663	91.293
3.2	401.012	136.472	94.823
3.3	-----	142.400	98.381
3.4	-----	148.448	101.965
3.5	-----	154.619	105.575
	-----	160.913	109.211

NOTE: Data Values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.818463 + 1.198842 (\text{log SCFM}) + 0.027053 (\text{log SCFM})^2 + 0.130891 (\text{log SCFM})^3 + 2.977611 (\text{log SCFM})^4$

Sigma = 1.885

B. $\text{Log (PSID)} = 1.562714 + 1.051215 (\text{log SCFM}) + 0.120053 (\text{log SCFM})^2 + 0.226061 (\text{log SCFM})^3$

Sigma = 0.742

C. $\text{Log (PSID)} = 1.431800 + 1.060084 (\text{log SCFM}) + 0.100362 (\text{log SCFM})^2$

Sigma = 0.526

TABLE XXXVII Part A
TEST NO. 5

FLOW RATE VERSUS DIFFERENTIAL PRESSURE CHARACTERISTICS OF TEST SPECIMEN S/N 027 AT THE COMPLETION OF TEST 10 AND AFTER THE APPLICATION OF 10 HIGH PRESSURE (703.07 Kg/cm² NOMINAL) GN₂ IMPACT CYCLES TO THE REVERSE SIDE (HPOF SPECIMEN S/N SIDE DOWNSTREAM) OF THE SPECIMEN

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	TEST SPECIMEN INLET PRESSURE (Kg/cm ²)			
	FORWARD DIRECTION 29.213 ^A	71.472 ^B	REVERSE DIRECTION 29.094 ^C	70.691 ^D
0.5	1.181	0.655	1.351	0.698
1.0	3.485	1.344	3.747	1.414
1.5	5.621	2.095	6.047	2.205
2.0	8.072	2.900	8.819	3.066
2.5	11.206	3.753	12.495	3.991
3.0	15.368	4.651	17.515	4.976
3.5	20.956	5.590	24.417	6.020
4.0	28.475	6.569	-----	7.118
4.5	-----	7.586	-----	8.270
5.0	-----	8.638	-----	9.473
5.5	-----	9.724	-----	10.727
6.0	-----	10.843	-----	12.028

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.542151 + 1.226964 (\log \text{Kg GN}_2/\text{hr}) - 0.579180 (\log \text{Kg GN}_2/\text{hr})^2 + 1.757502 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma + 0.220

B. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.128483 + 1.073701 (\log \text{Kg GN}_2/\text{hr}) + 0.117547 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.025

C. $\text{Log (Kg/cm}^2 \text{ differential)} = + 0.573649 + 1.195913 (\log \text{Kg GN}_2/\text{hr}) - 0.393261 (\log \text{Kg GN}_2/\text{hr})^2 + 1.737301 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.103

D. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.150379 + 1.067153 (\log \text{Kg GN}_2/\text{hr}) + 0.164195 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.076

TABLE XXXVII Part B
TEST NO. 5

FLOW RATE VERSUS DIFFERENTIAL PRESSURE CHARACTERISTICS OF TEST SPECIMEN S/N 027 AT THE COMPLETION OF TEST 10 AND AFTER THE APPLICATION OF 10 HIGH PRESSURE (703.07 Kg/cm² NOMINAL) GN₂ IMPACT CYCLES TO THE REVERSE SIDE (HPOF SPECIMEN S/N SIDE DOWNSTREAM) OF THE SPECIMEN

FLOW RATE (liters* GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	TEST SPECIMEN INLET PRESSURE (Kg/cm ²)			
	FORWARD DIRECTION 29.213 ^A	71.472 ^B	REVERSE DIRECTION 29.094 ^C	70.691 ^D
10	2.125	0.916	2.336	0.969
15	3.668	1.407	3.940	1.479
20	5.143	1.926	5.521	2.026
25	6.726	2.473	7.282	2.607
30	8.554	3.044	9.377	3.221
35	10.741	3.638	11.943	3.865
40	13.400	4.253	15.127	4.539
45	16.658	4.890	19.095	5.241
50	20.661	5.546	24.050	5.971
55	25.582	6.222	-----	6.727
60	-----	6.916	-----	7.510
65	-----	7.627	-----	8.318
70	-----	8.356	-----	9.151
75	-----	9.102	-----	10.008
80	-----	9.864	-----	10.889
85	-----	10.642	-----	11.793
90	-----	11.435	-----	12.721
95	-----	12.244	-----	14.644
100	-----	13.067	-----	14.644

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -4.381709 + 9.634467 (\text{log liters GN}_2/\text{min})$
 $-6.682832 (\text{log liters GN}_2/\text{min})^2 + 1.757352 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.220

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.957044 + 0.801521 (\text{log liters GN}_2/\text{min})$
 $+ 0.117547 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.025

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -4.033712 + 9.091686 (\text{log liters GN}_2/\text{min})$
 $-6.426742 (\text{log liters GN}_2/\text{min})^2 + 1.737148 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.103

D. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.865039 + 0.686957 (\text{log liters GN}_2/\text{min})$
 $+ 0.164195 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.076

TABLE XXXVII Part C
TEST NO. 5

FLOW RATE VERSUS DIFFERENTIAL PRESSURE CHARACTERISTICS OF TEST SPECIMEN S/N 027 AT THE COMPLETION OF TEST 10 AND AFTER THE APPLICATION OF 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN_2 IMPACT CYCLES TO THE REVERSE SIDE (HPOF SPECIMEN S/N SIDE DOWNSTREAM) OF THE SPECIMEN

FLOW RATE (lbs GN_2 /hr)	<u>NET DIFFERENTIAL PRESSURE (Kg/cm² Differential)</u>			
	<u>TEST SPECIMEN INLET PRESSURE (Kg/cm²)</u>			
	FORWARD DIRECTION <u>415.5^A</u>	REVERSE DIRECTION <u>413.8^C</u>	FORWARD DIRECTION <u>1016.6^B</u>	REVERSE DIRECTION <u>1005.5^D</u>
1.0	13.630	8.447	15.827	9.044
1.5	29.210	12.741	32.175	13.474
2.0	43.861	17.230	47.340	18.136
2.5	57.639	21.901	61.811	23.022
3.0	71.310	26.745	76.519	28.125
3.5	85.571	31.751	92.240	33.436
4.0	100.988	36.910	109.605	38.947
4.5	118.045	42.217	129.174	44.652
5.0	137.186	47.665	151.485	50.544
5.5	158.852	53.248	177.095	56.618
6.0	183.503	58.962	206.600	62.870
6.5	211.633	64.803	240.662	69.295
7.0	243.786	70.766	280.017	75.890
7.5	280.566	76.849	325.502	82.650
8.0	322.650	83.048	378.060	89.573
8.5	370.799	89.360	-----	96.656
9.0	-----	95.783	-----	103.895
9.5	-----	102.315	-----	111.290
10.0	-----	108.952	-----	118.837
10.5	-----	115.694	-----	126.533
11.0	-----	122.538	-----	134.378
11.5	-----	129.483	-----	142.370
12.0	-----	136.526	-----	150.506
12.5	-----	143.666	-----	158.784
13.0	-----	150.902	-----	167.205
13.5	-----	158.232	-----	175.764
14.0	-----	165.655	-----	184.463
14.5	-----	173.169	-----	193.298
15.0	-----	180.774	-----	202.270

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{ lbs GN}_2/\text{hr}) + c (\log \text{ lbs GN}_2/\text{hr})^2 + d (\log \text{ lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 1.134502 + 2.246148 (\log \text{ lbs GN}_2/\text{hr}) - 2.389373 (\log \text{ lbs GN}_2/\text{hr})^2 + 1.757502 (\log \text{ lbs GN}_2/\text{hr})^3$
Sigma = 3.131

B. $\text{Log (PSID)} = 0.926703 + 0.992987 (\log \text{ lbs GN}_2/\text{hr}) + 0.117547 (\log \text{ lbs GN}_2/\text{hr})^2$
Sigma = 0.362

C. $\text{Log (PSID)} = 1.199393 + 2.080292 (\log \text{ lbs GN}_2/\text{hr}) - 2.182648 (\log \text{ lbs GN}_2/\text{hr})^2 + 1.737302 (\log \text{ lbs GN}_2/\text{hr})^3$
Sigma = 1.461

D. $\text{Log (PSID)} = 0.956347 + 0.954408 (\log \text{ lbs GN}_2/\text{hr}) + 0.164195 (\log \text{ lbs GN}_2/\text{hr})^2$
Sigma = 1.080

TABLE XXXVII Part D
TEST NO. 5

FLOW RATE VERSUS DIFFERENTIAL PRESSURE CHARACTERISTICS OF TEST SPECIMEN S/N 027 AT THE COMPLETION OF TEST 10 AND AFTER THE APPLICATION OF 10 HIGH PRESSURE (10,000 PSIA NOMINAL) GN_2 IMPACT CYCLES TO THE REVERSE SIDE (HPOF SPECIMEN S/N SIDE DOWNSTREAM) OF THE SPECIMEN

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)			
	TEST SPECIMEN INLET PRESSURE (Kg/cm ²)			
	FORWARD DIRECTION	REVERSE DIRECTION		
	415.5 ^A	1016.6 ^B	413.8 ^C	1005.5 ^D
0.4	36.289	14.840	39.492	15.650
0.5	48.622	18.803	52.305	19.778
0.6	60.484	22.901	64.842	24.073
0.7	72.387	27.127	77.694	28.530
0.8	84.773	31.475	91.351	33.143
0.9	98.010	35.939	106.225	37.907
1.0	112.419	40.515	122.684	42.818
1.1	128.295	45.199	141.081	47.872
1.2	145.923	49.986	161.772	53.065
1.3	165.598	54.874	185.133	58.394
1.4	187.625	59.860	211.568	63.855
1.5	212.336	64.940	241.517	69.447
1.6	240.087	70.114	275.469	75.166
1.7	271.274	75.377	313.968	81.011
1.8	306.330	80.728	357.618	86.978
1.9	345.734	86.166	407.095	93.067
2.0	390.020	91.688	-----	99.276
2.1	-----	97.293	-----	105.602
2.2	-----	102.980	-----	112.044
2.3	-----	108.746	-----	118.601
2.4	-----	114.591	-----	125.271
2.5	-----	120.513	-----	132.053
2.6	-----	126.511	-----	138.946
2.7	-----	132.584	-----	145.948
2.8	-----	138.730	-----	153.058
2.9	-----	144.950	-----	160.276
3.0	-----	151.242	-----	167.600
3.1	-----	157.604	-----	175.030
3.2	-----	164.037	-----	182.564
3.3	-----	170.539	-----	190.202
3.4	-----	177.109	-----	197.942
3.5	-----	183.747	-----	205.784

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3$$

A. $\text{Log (PSID)} = 2.050841 + 1.342675 (\text{log SCFM}) + 0.972388 (\text{log SCFM})^2 + 1.757502 (\text{log SCFM})^3$

Sigma = 3.131

B. $\text{Log (PSID)} = 1.607619 + 1.142883 (\text{log SCFM}) + 0.117547 (\text{log SCFM})^2$

Sigma = 0.362

C. $\text{Log (PSID)} = 2.088787 + 1.415800 (\text{log SCFM}) + 1.140475 (\text{log SCFM})^2 + 1.737301 (\text{log SCFM})^3$

Sigma = 1.461

D. $\text{Log (PSID)} = 1.631628 + 1.163790 (\text{log SCFM}) + 0.164195 (\text{log SCFM})^2$

Sigma = 1.080

TABLE XXXVIII

PART A

Influence of high pressure GN_2 (703.07 Kg/cm^2 nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 29.177 Kg/cm^2 .

GN ₂ Flow Rate ($\text{Kg}/\text{GN}^2/\text{hr}$)	Net Differential Pressure (Kg/cm^2 differential)					
	After 2 Impact Cycles		After 11 Impact Cycles			
	Baseline (Clean Condition)	Observed	Charge From Baseline	Observed	Charge From Baseline	
1.0	2.451	3.178	+0.727	2.471	+0.020	
2.0	5.510	7.816	+2.306	5.968	+0.458	
3.0	9.499	15.017	+5.518	10.952	+1.453	
4.0	15.150	27.201	+12.051	18.680	+3.530	
5.0	23.205	*	-	*	-	

*Value too large to measure (greater than inlet pressure).

TABLE XXXVIII

Part B

Influence of high pressure GN₂ (703.07 Kg/cm² nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 29.177 Kg/cm².

GN ₂ Flow Rate (Liters* GN ² /min.)	Net Differential Pressure (Kg/cm ² differential)					
	Baseline (Clean Condition)	After 2 Impact Cycles		After 11 Impact Cycles		
		Observed	Charge From Baseline	Observed	Charge From Baseline	
15	2.577	3.356	+0.0779	2.610	+0.033	
30	5.806	8.304	+2.498	6.322	+0.516	
45	10.122	16.254	+6.132	11.769	+1.647	
60	16.345	**	-	20.396	+4.051	
75	25.341	**	-	**	-	

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia).

**Value too large to measure (greater than inlet pressure).

TABLE XXXVIII

PART C

Influence of high pressure GN₂ (10,000 psia nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 415 psia.

GN ₂ Flow Rate (lbs/hr)	Net Differential Pressure (psid)					
	Baseline (Clean Condition)	After 2 Impact Cycles		After 11 Impact Cycles		Charge From Baseline
		Observed	Charge From Baseline	Observed	Charge From Baseline	
2	30.981	39.715	+8.734	30.902	-0.079	
4	69.654	97.111	+27.457	74.599	+4.945	
6	117.347	179.575	+62.218	132.910	+15.553	
8	182.260	311.656	+129.396	219.095	+36.835	
10	271.873	*	-	348.010	+76.137	

*Value too large to measure (greater than inlet pressure).

TABLE XXXVIII

PART D

Influence of high pressure GN₂ (10,000 psia nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 415

GN ₂ Flow Rate (SCFM)	Baseline (Clean Condition)	Net Differential Pressure (psid)			
		After 2 Impact Cycles		After 11 Impact Cycles	
		Observed	Charge From Baseline	Observed	Charge From Baseline
0.5	34.213	44.284	+10.071	34.445	+0.232
1.0	76.890	108.742	+31.852	83.128	+6.238
1.5	132.037	207.576	+75.539	151.755	+19.738
2.0	209.644	373.333	+163.689	257.401	+47.757
2.5	319.706	*	-	*	-

*Value to large to measure (greater than inlet pressure).

TABLE XXXIX

PART A

Influence of high pressure GN_2 (703.07 Kg/cm^2 nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of $703.07 \text{ Kg}/\text{cm}^2$.

<u>GN_2 Flow Rate ($\text{Kg } \text{GN}_2/\text{hr}$)</u>	<u>Net Differential Pressure (Kg/cm^2 differential)</u>					
	<u>Baseline (Clean Condition)</u>	<u>After 2 Impact Cycles</u>		<u>After 11 Impact Cycles</u>		
		<u>Observed</u>	<u>Charge From Baseline</u>	<u>Observed</u>	<u>Charge From Baseline</u>	
1.0	0.940	1.251	+0.311	0.936	-0.004	
2.0	2.029	2.853	+0.824	2.165	+0.136	
3.0	3.229	4.681	+1.452	3.580	+0.351	
4.0	4.519	6.689	+2.170	5.144	+0.625	
5.0	5.887	8.852	+2.965	6.835	+0.948	

TABLE XXXIX

PART B

Influence of high pressure GN₂ (703.07 Kg/cm² nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028, during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 703.07 Kg/cm².

GN ₂ Flow Rate (Liters* GN ² /min.)	Net Differential Pressure (Kg/cm ² differential)					
	Baseline (Clean Condition)	After 2 Impact Cycles		After 11 Impact Cycles		
		Observed	Charge From Baseline	Observed	Charge From Baseline	
15	0.984	1.315	+0.331	0.984	0.000	
30	2.129	3.003	+0.874	2.280	+0.151	
45	3.391	4.931	+1.540	3.774	+0.383	
60	4.750	7.052	+2.302	5.427	+0.677	
75	6.191	9.337	+3.146	7.215	+1.024	
90	7.707	11.769	+4.062	9.125	+1.418	

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia).

TABLE XXXIX

PART C

Influence of high pressure GN₂ (10,000 psia nominal) impact cycles, on differential pressure characteristics of test specimen S/N 028 during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 1,000 psia.

GN ₂ Flow Rate (lbs GN ² /hr)	Net Differential Pressure (psid)				
	Baseline (Clean Condition)	After 2 Impact Cycles	After 11 Impact Cycles	Charge From Baseline	
	<u>Observed</u>	<u>Observed</u>	<u>Observed</u>	<u>Baseline</u>	
2	12.031	15.884	+3.853	11.859	-0.172
4	25.856	36.083	+10.227	27.323	+1.467
6	41.039	59.063	+18.024	45.082	+4.043
8	57.329	84.266	+26.937	64.675	+7.346
10	74.575	111.374	+36.799	85.842	+11.267
12	92.675	140.179	+47.504	108.410	+15.735
13	102.020	155.168	+53.148	120.179	+18.159

TABLE XXXIX

PART D

Influence of high pressure GN₂ (10,000 psia nominal) impact cycles, on differential pressure characteristics of test specimen S/N 02P during initial loading with 5.2 mg of synthetic contaminant at a test specimen inlet pressure of 1,000 psia .

GN ₂ Flow Rate (SCFM)	Net Differential Pressure (psid)				Charge From Baseline
	Baseline (Clean Condition)	After 2 Impact Cycles		After 11 Impact Cycles	
		Observed	Charge From Baseline	Observed	
0.5	13.147	17.475	+4.328	13.069	-0.078
1.0	28.358	39.826	+11.468	30.207	+1.849
1.5	45.109	65.314	+20.205	49.933	+4.824
2.0	63.111	93.311	+30.200	71.728	+8.617
2.5	82.193	123.458	+41.265	95.301	+13.108
3.0	102.240	155.522	+53.282	120.456	+18.216

TABLE XL Part A
TEST NO. 5

TEST SPECIMEN S/N 025

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA. DATA ACQUIRED IN THE FORWARD FLOW DIRECTION (S/N SIDE UPSTREAM) BEFORE AND AFTER SPECIMEN CONTAMINATED WITH 46 mg OF Fe_2O_3 AND SUBJECTED TO 100 HIGH PRESSURE (703.07 Kg/cm^2 NOMINAL) GN_2 IMPACT CYCLES.

FLOW RATE ($Kg\ GN_2/hr$)	NET DIFFERENTIAL PRESSURE (Kg/cm^2 DIFFERENTIAL)	
	TEST SPECIMEN INLET PRESSURE (Kg/cm^2)	
	CLEAN CONDITION 70.914 ^A	CONTAMINATED CONDITION 70.956 ^B
0.5	0.449	4.085
1.0	0.940	9.041
1.5	1.469	15.142
2.0	2.029	22.336
2.5	2.617	30.594
3.0	3.229	39.899
3.5	3.864	50.238
4.0	4.519	61.608
4.5	5.194	-----
5.0	5.887	-----
5.5	6.597	-----
6.0	7.324	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.956200 + 1.225478 (\log \text{Kg GN}_2/\text{hr}) + 0.263812 (\log \text{Kg GN}_2/\text{hr})^2$

Sigma = 0.044

B. $\text{Log (Kg/cm}^2 \text{ differential)} = - 0.026829 + 1.087518 (\log \text{Kg GN}_2/\text{hr}) + 0.074869 (\log \text{Kg GN}_2/\text{hr})^2$

Sigma = 0.016

TABLE XL Part B

TEST NO. 5

TEST SPECIMEN S/N 025

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA. DATA ACQUIRED IN THE FORWARD FLOW DIRECTION (S/N SIDE UPSTREAM) BEFORE AND AFTER SPECIMEN CONTAMINATED WITH 46 mg OF Fe_2O_3 AND SUBJECTED TO 100 HIGH PRESSURE (703.07 Kg/cm^2 NOMINAL) GN_2 IMPACT CYCLES.

FLOW RATE (liters* GN_2/min)	NET DIFFERENTIAL PRESSURE (Kg/cm^2 DIFFERENTIAL)	
	TEST SPECIMEN INLET PRESSURE (Kg/cm^2)	
	CLEAN CONDITION 70.914 ^A	CONTAMINATED CONDITION 70.956 ^B
10	0.636	5.881
15	0.984	9.523
20	1.351	13.715
25	1.733	18.440
30	2.129	23.685
35	2.538	29.443
40	2.959	35.707
45	3.391	42.474
50	3.834	49.741
55	4.287	57.506
60	4.750	65.768
65	5.222	-----
70	5.702	-----
75	6.191	-----
80	6.688	-----
85	7.194	-----
90	7.707	-----
95	8.227	-----
100	8.755	-----

*At 21.1°C (70°F) and 1.033 Kg/cm^2 (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.185558 + 0.914158 (\text{log liters GN}_2/\text{min}) + 0.074869 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.016

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.108993 + 0.614617 (\text{log liters GN}_2/\text{min}) + 0.263812 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.044

TABLE XL Part C
TEST NO. 5
TEST SPECIMEN S/N 025

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA. DATA ACQUIRED IN THE FORWARD FLOW DIRECTION (S/N SIDE UPSTREAM) BEFORE AND AFTER SPECIMEN CONTAMINATED WITH 46 mg OF Fe₂O₃ AND SUBJECTED TO 100 HIGH PRESSURE (10,000 PSIA NOMINAL) GN₂ IMPACT CYCLES.

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)	CLEAN CONDITION 1008.6 ^A	CONTAMINATED CONDITION 1009.2 ^B
1.0		5.776	52.427
1.5		8.839	81.589
2.0		12.031	114.244
2.5		15.338	150.283
3.0		18.750	189.618
3.5		22.258	232.183
4.0		25.856	277.925
4.5		29.537	326.803
5.0		33.297	378.787
5.5		37.132	433.850
6.0		41.039	491.974
6.5		45.015	553.141
7.0		49.057	617.341
7.5		53.163	684.564
8.0		57.329	754.803
8.5		61.556	828.053
9.0		65.840	904.311
9.5		70.180	983.575
10.0		74.575	-----
10.5		79.023	-----
11.0		83.523	-----
11.5		88.074	-----
12.0		92.675	-----
12.5		97.324	-----
13.0		102.020	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2$$

A. $\text{Log (PSID)} = 1.719552 + 1.044330 (\log \text{lbs GN}_2/\text{hr}) + 0.263812 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.631

B. $\text{Log (PSID)} = 0.761617 + 1.036109 (\log \text{lbs GN}_2/\text{hr}) + 0.074869 (\log \text{lbs GN}_2/\text{hr})^2$
Sigma = 0.225

TABLE XL Part D
TEST NO. 5
TEST SPECIMEN S/N 025

FLOW RATE VERSUS DIFFERENTIAL PRESSURE DATA. DATA ACQUIRED IN THE FORWARD FLOW DIRECTION (S/N SIDE UPSTREAM) BEFORE AND AFTER SPECIMEN CONTAMINATED WITH 46 mg OF Fe₂O₃ AND SUBJECTED TO 100 HIGH PRESSURE (10,000 PSIA NOMINAL) GN₂ IMPACT CYCLES.

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)	CLEAN CONDITION 1008.6 ^A	CONTAMINATED CONDITION 1009.2 ^B
0.4		10.333	96.603
0.5		13.147	126.161
0.6		16.044	158.246
0.7		19.019	192.804
0.8		22.066	229.792
0.9		25.180	269.178
1.0		28.358	310.932
1.1		31.597	355.035
1.2		34.894	401.466
1.3		38.246	450.213
1.4		41.652	501.262
1.5		45.109	554.605
1.6		48.616	610.233
1.7		52.170	668.140
1.8		55.772	728.322
1.9		59.419	790.775
2.0		63.111	855.496
2.1		66.845	922.484
2.2		70.621	991.739
2.3		74.439	-----
2.4		78.296	-----
2.5		82.193	-----
2.6		86.128	-----
2.7		90.101	-----
2.8		94.112	-----
2.9		98.158	-----
3.0		102.240	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2$$

A. $\text{Log (PSID)} = 1.452677 + 1.131582 (\log \text{SCFM}) + 0.094315 (\log \text{SCFM})^2$

Sigma = 0.225

B. $\text{Log (PSID)} = 2.492666 + 1.380745 (\log \text{SCFM}) + 0.263812 (\log \text{SCFM})^2$

Sigma = 0.631

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TABLE XLI Part A

TEST NO. 5
 HPOF TEST SPECIMEN S/N 6
 CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (Kg/GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)			
	TEST SPECIMEN	INLET PRESSURE (Kg/sq cm)		
	29.350 ^A	48.423 ^B	70.188 ^C	203.019 ^D
0.5	0.685	0.401	0.294	0.134
1.0	1.510	0.788	0.582	0.264
1.5	2.306	1.200	0.885	0.399
2.0	3.129	1.635	1.203	0.540
2.5	4.011	2.092	1.534	0.685
3.0	4.970	2.568	1.878	0.835
3.5	6.022	3.064	2.234	0.989
4.0	7.178	3.578	2.601	1.147
4.5	8.449	4.109	2.978	1.308
5.0	9.846	4.657	3.365	1.473
5.5	11.380	5.221	3.762	1.642
6.0	13.061	5.800	4.168	1.813

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = A + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.179006 + 1.056477 (\text{log Kg GN}_2/\text{hr}) - 0.149644 (\text{log Kg GN}_2/\text{hr})^2 + 0.436116 (\text{log Kg GN}_2/\text{hr})^3$
Sigma = 0.042

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.103226 + 1.013552 (\text{log (Kg GN}_2/\text{hr}) + 0.128739 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.032

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.235119 + 1.015421 (\text{log Kg GN}_2/\text{hr}) + 0.107207 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.013

D. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.578458 + 1.005324 (\text{log Kg GN}_2/\text{hr}) + 0.090221 (\text{log Kg GN}_2/\text{hr})^2$
Sigma = 0.004

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TABLE XLI Part B

TEST NO. 5

HPOF TEST SPECIMEN S/N 6

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (liters GN ₂ /min)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)					
	TEST SPECIMEN	INLET PRESSURE (KG/cm ²)	29.350 ^A	48.423 ^B	70.188 ^C	
10		0.403	1.019	0.549	0.403	0.184
15		0.606	1.580	0.823	0.606	0.275
20		0.817	2.131	1.108	0.817	0.369
25		1.034	2.691	1.404	1.034	0.465
30		1.259	3.274	1.712	1.259	0.564
35		1.490	3.887	2.029	1.490	0.665
40		1.727	4.537	2.357	1.727	0.769
45		1.969	5.230	2.694	1.969	0.874
50		2.218	5.969	3.040	2.218	0.981
55		2.471	6.758	3.396	2.471	1.091
60		2.730	7.601	3.759	2.730	1.202
65		2.993	8.502	4.131	2.993	1.315
70		3.261	9.465	4.511	3.261	1.429
75		3.534	10.492	4.898	3.534	1.546
80		3.812	11.588	5.294	3.812	1.664
85		4.094	12.757	5.697	4.094	1.783
90	-----	4.380	-----	6.107	4.380	-----
95	-----	4.670	-----	-----	4.670	-----
100	-----	-----	-----	-----	-----	-----

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.903590 + 3.127330 (\text{log liters GN}_2/\text{min}) - 1.649433 (\text{log liters GN}_2/\text{min})^2 + 0.433783 (\text{log liters GN}_2/\text{min})^3$
Sigma = 0.042

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.103718 + 0.714376 (\text{log liters GN}_2/\text{min}) + 0.129208 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.032

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.276438 + 0.778414 (\text{log liters GN}_2/\text{min}) + 0.103864 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.013

D. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.616014 + 0.788436 (\text{log liters GN}_2/\text{min}) + 0.092941 (\text{log liters GN}_2/\text{min})^2$
Sigma = 0.005

TABLE XLI Part C

TEST NO. 5

HPOF TEST SPECIMEN S/N 6

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (lbs GN ₂ /hour)	<u>NET DIFFERENTIAL PRESSURE (PSID)</u>			
	TEST SPECIMEN	INLET PRESSURE (PSIA)		
	<u>417.5^A</u>	<u>688.7^B</u>	<u>998.2^C</u>	<u>2887.6^D</u>
1.0	8.599	5.212	3.816	1.738
1.5	14.102	7.654	5.635	2.565
2.0	19.368	10.166	7.499	3.406
3.0	29.629	15.407	11.366	5.136
4.0	40.075	20.924	15.409	6.929
5.0	51.099	26.701	19.614	8.779
6.0	62.943	32.722	23.971	10.684
7.0	75.777	38.973	28.470	12.638
8.0	89.740	45.442	33.104	14.640
9.0	104.957	52.120	37.865	16.687
10.0	121.542	58.999	42.748	18.777
11.0	139.609	66.072	47.747	20.908
12.0	159.270	73.331	52.859	23.078
13.0	180.642	80.771	58.080	25.286
14.0	203.842	88.388	63.406	27.530
15.0	228.990	96.176	68.834	29.810

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (differential pressure)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

A. $\text{Log (differential pressure)} = 0.934454 + 1.311418 (\log \text{lbs GN}_2/\text{hr}) - 0.595980 (\log \text{lbs GN}_2/\text{hr})^2 + 0.434834 (\log \text{lbs GN}_2/\text{hr})^3$

Sigma = 0.600

B. $\text{Log (differential pressure)} = 0.717006 + 0.925159 (\log \text{lbs GN}_2/\text{hr}) + 0.128681 (\log \text{lbs GN}_2/\text{hr})^2$

Sigma = 0.462

C. $\text{Log (differential pressure)} = 0.581610 + 0.942510 (\log \text{lbs GN}_2/\text{hr}) + 0.106792 (\log \text{lbs GN}_2/\text{hr})^2$

Sigma = 0.179

D. $\text{Log (differential pressure)} = 0.240165 + 0.942905 (\log \text{lbs GN}_2/\text{hr}) + 0.090553 (\log \text{lbs GN}_2/\text{hr})^2$

Sigma = 0.062

TABLE XLI Part D
 TEST NO. 5
 HPOF TEST SPECIMEN S/N 6
 CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)				
	TEST SPECIMEN	INLET PRESSURE (PSIA)	417.5 ^A	688.7 ^B	998.2 ^C
0.4		16.628	8.831	6.297	2.958
0.5		21.136	11.038	7.990	3.695
0.6		25.582	13.299	9.712	4.443
0.7		30.025	15.613	11.458	5.204
0.8		34.512	17.980	13.227	5.976
0.9		39.078	20.397	15.015	6.759
1.0		43.750	22.864	16.821	7.553
1.1		48.551	25.378	18.644	8.358
1.2		53.499	27.939	20.483	9.173
1.3		58.610	30.545	22.337	9.999
1.4		63.898	33.195	24.204	10.833
1.5		69.375	35.889	26.084	11.678
1.6		75.052	38.625	27.977	12.531
1.7		80.942	41.402	29.881	13.393
1.8		87.054	44.219	31.796	14.264
1.9		93.397	47.076	33.723	15.144
2.0		99.982	49.972	35.659	16.032
2.1		106.817	52.907	37.606	16.928
2.2		113.913	55.879	39.562	17.832
2.3		121.278	58.888	41.528	18.744
2.4		128.921	61.934	43.502	19.663
2.5		136.852	65.015	45.485	20.590
2.6		145.080	68.132	47.477	21.525
2.7		153.614	71.284	49.476	22.467
2.8		162.463	74.470	51.484	23.416
2.9		171.637	77.690	53.499	24.372
3.0		181.145	80.944	55.521	25.335
3.1		190.998	84.231	57.551	26.305
3.2		201.204	87.550	59.588	27.281
3.3		211.773	90.903	61.633	28.264
3.4		222.717	94.287	63.683	29.254
3.5		234.044	97.703	65.741	30.250

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (differential pressure)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3$$

A. $\text{Log (differential pressure)} = 1.640983 + 1.081860 (\log \text{SCFM}) + 0.237175 (\log \text{SCFM})^2 + 0.431564 (\log \text{SCFM})^3$
Sigma = 0.603

B. $\text{Log (differential pressure)} = 1.359146 + 1.089350 (\log \text{SCFM}) + 0.128645 (\log \text{SCFM})^2$
Sigma = 0.460

C. $\text{Log (differential pressure)} = 1.225857 + 1.078981 (\log \text{SCFM}) + 0.106686 (\log \text{SCFM})^2$
Sigma = 0.179

D. $\text{Log (differential pressure)} = 0.878142 + 1.058704 (\log \text{SCFM}) + 0.089802 (\log \text{SCFM})^2$
Sigma = 0.062

TABLE XLII
Test Specimen S/N 006

Bubble Point and Cleanliness Verification Test Data Obtained Before and After the Clean Condition - Flow Rate versus Differential Pressure DCT

	<u>NVR</u> (mg/100ml)	Cleanliness Verification			
		<u><5</u>	<u>5-15</u>	<u>16-25</u>	<u>>25</u>
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0

Data Obtained Before DCT

S/N Side of Specimen	<0.1	No silting	1	0	0
Unserialized Side of Specimen	<0.1	No silting	0	0	0

Data Obtained After DCT

S/N Side of Specimen	0.2	No silting	4	1	0
Unserialized Side of Specimen	0.2	No silting	0	0	0

* Specification, Contamination Control Requirements for Space Shuttle Program

** No silting allowed

Standard Bubble Point

Before DCT 151.4 cm (59.6 inches) of water pressure.

After DCT 163.8 cm (64.5 inches) of water pressure.

TABLE XLIII Part A

TEST NO. 5

HPOF TEST SPECIMEN S/N 020

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kb/sq cm)	
		29.190 ^A	49.350 ^B
0.5		0.627	0.386
1.0		1.399	0.788
1.5		2.178	1.216
2.0		2.996	1.668
2.5		3.873	2.140
3.0		4.819	2.630
3.5		5.845	3.138
4.0		6.958	3.662
4.5		8.164	4.201
5.0		9.471	4.754
5.5		10.884	5.321
6.0		12.410	5.900
			4.348

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = 0.145693 + 1.099554 (\log \text{Kg GN}_2/\text{hr}) - 0.098008 (\log \text{Kg GN}_2/\text{hr})^2 + 0.322142 (\log \text{Kg GN}_2/\text{hr})^3$
Sigma = 0.065

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.103538 + 1.05526 (\log \text{Kg GN}_2/\text{hr}) + 0.087629 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.016

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -0.234785 + 1.051610 (\log \text{Kg GN}_2/\text{hr}) + 0.090361 (\log \text{Kg GN}_2/\text{hr})^2$
Sigma = 0.006

TABLE XLIII Part B

TEST NO. 5

HPOF TEST SPECIMEN S/N 020

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (liters GN ₂ /min)*	NET DIFFERENTIAL PRESSURE (Kg/cm ² Differential)		
	TEST SPECIMEN	INLET PRESSURE (Kg/cm ²)	
	29.190 ^A	49.350 ^B	68.050 ^C
10	0.995	0.568	0.421
15	1.525	0.857	0.634
20	2.065	1.157	0.854
25	2.626	1.466	1.081
30	3.212	1.785	1.315
35	3.829	2.112	1.556
40	4.478	2.448	1.803
45	5.163	2.792	2.056
50	5.884	3.142	2.314
55	6.645	3.500	2.578
60	7.446	3.865	2.847
65	8.289	4.236	3.120
70	9.176	4.614	3.399
75	10.108	4.998	3.682
80	11.086	5.388	3.970
85	12.113	5.783	4.262
90	13.188	6.184	4.558
95	14.314	6.591	4.859
100	15.493	7.003	5.163

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3$$

A. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.412082 + 1.990013 (\text{log liters GN}_2/\text{min}) - 0.816113 (\text{log liters GN}_2/\text{min})^2 + 0.235829 (\text{log liters GN}_2/\text{min})^3$

Sigma = 0.059

B. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.148831 + 0.809823 (\text{log liters GN}_2/\text{min}) + 0.093616 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.019

C. $\text{Log (Kg/cm}^2 \text{ differential)} = -1.264332 + 0.789478 (\text{log liters GN}_2/\text{min}) + 0.099574 (\text{log liters GN}_2/\text{min})^2$

Sigma = 0.006

TABLE XLIII Part C

TEST NO. 5

HPOF TEST SPECIMEN S/N 020

CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)		
	415.2 ^A	701.9 ^B	967.9 ^C
1.0	7.897	4.989	3.694
1.5	12.910	7.512	5.555
2.0	17.870	10.120	7.478
2.5	22.832	12.809	9.459
3.0	27.850	15.571	11.494
3.5	32.964	18.404	13.580
4.0	38.209	21.303	15.715
4.5	43.607	24.264	17.896
5.0	49.181	27.284	20.120
5.5	54.945	30.362	22.386
6.0	60.915	33.494	24.693
6.5	67.103	36.678	27.038
7.0	73.521	39.914	29.420
7.5	80.179	43.198	31.838
8.0	87.087	46.530	34.292
8.5	94.254	49.909	36.780
9.0	101.690	53.332	39.301
9.5	109.403	56.799	41.854
10.0	117.402	60.309	44.438
10.5	125.695	63.861	47.054
11.0	134.291	67.454	49.700
11.5	143.197	71.087	52.375
12.0	152.424	74.759	55.079
12.5	161.977	78.469	57.812
13.0	171.867	82.217	60.572
13.5	182.102	86.002	63.360
14.0	192.689	89.824	66.175
14.5	203.638	93.681	69.016
15.0	214.956	97.574	71.883

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3$$

A. $\text{Log (PSID)} = 0.897436 + 1.277286 (\log \text{lbs GN}_2/\text{hr}) - 0.425329 (\log \text{lbs GN}_2/\text{hr})^2 + 0.320281 (\log \text{lbs GN}_2/\text{hr})^3$

Sigma = 0.929

B. $\text{Log (PSID)} = 0.698017 + 0.993749 (\log \text{lbs GN}_2/\text{hr}) + 0.088619 (\log \text{lbs GN}_2/\text{hr})^2$

Sigma = 0.230

C. $\text{Log (PSID)} = 0.567535 + 0.990176 (\log \text{lbs GN}_2/\text{hr}) + 0.090048 (\log \text{lbs GN}_2/\text{hr})^2$

Sigma = 0.089

TABLE XLIII Part D
 TEST NO. 5
 HPOF TEST SPECIMEN S/N 020
 CLEAN CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)		
	TEST SPECIMEN INLET PRESSURE (PSIA)		
	415.2 ^A	701.9 ^B	967.9 ^C
0.4	15.265	8.742	6.451
0.5	19.563	11.035	8.142
0.6	23.878	13.387	9.877
0.7	28.242	15.794	11.652
0.8	32.682	18.253	13.465
0.9	37.219	20.763	15.315
1.0	41.870	23.319	17.200
1.1	46.648	25.922	19.117
1.2	51.565	28.568	21.067
1.3	56.631	31.256	23.048
1.4	61.854	33.985	25.059
1.5	67.244	36.753	27.098
1.6	72.807	39.560	29.165
1.7	78.551	42.404	31.260
1.8	84.481	45.284	33.381
1.9	90.604	48.200	35.527
2.0	96.926	51.149	37.699
2.1	103.453	54.133	39.896
2.2	110.190	57.150	42.116
2.3	117.144	60.198	44.361
2.4	124.319	63.279	46.628
2.5	131.721	66.390	48.918
2.6	139.356	69.532	51.230
2.7	147.228	72.704	53.564
2.8	155.345	75.905	55.919
2.9	163.709	79.135	58.295
3.0	172.329	82.393	60.693
3.1	181.208	85.679	63.110
3.2	190.352	88.993	65.548
3.3	199.767	92.334	68.005
3.4	209.459	95.702	70.483
3.5	219.432	99.097	72.979

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCFM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

A. $\text{Log (PSID)} = 1.621903 + 1.125428 (\text{log SCFM}) + 0.188038 (\text{log SCFM})^2 + 0.319323 (\text{log SCFM})^3$

$\text{Sigma} = 0.932$

B. $\text{Log (PSID)} = 1.367716 + 1.106307 (\text{log SCFM}) + 0.089312 (\text{log SCFM})^2$

$\text{Sigma} = 0.232$

C. $\text{Log (PSID)} = 1.235518 + 1.105521 (\text{log SCFM}) + 0.088513 (\text{log SCFM})^2$

$\text{Sigma} = 0.088$

TABLE XLIV
Test Specimen S/N 020

Cleanliness Verification and Standard Bubble Point Data Obtained in the Specimen Prior to DCT #5

	NVR (mg/100ml)	Cleanliness Verification			
		<u>< 5</u>	<u>5-15</u>	<u>16-25</u>	<u>>25</u>
SN-C-0005* Level 25A Requirement	1	Unlimited**	19	4	0
S/N Side of Specimen	0.3	No silting	1	0	0
Unserialized Side of Specimen	0.3	No silting	10	3	0

* Specification Contamination Control Requirements for the Space Shuttle Program

** No silting allowed.

Standard Bubble Point - 134.7 cm (53.04 inches) of water pressure

TABLE XLV Part A

TEST NO. 11

CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 020NOMINAL TEST SPECIMEN INLET PRESSURE = 29.177 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2	
0.5	0.627	0.600	0.649	0.646	0.606	0.762	0.770	0.871	1.154	1.387
1.0	1.399	1.392	1.470	1.466	1.466	1.561	1.577	1.723	1.752	1.756
1.5	2.178	2.184	2.309	2.304	2.325	2.484	2.536	2.793	2.863	2.847
2.0	2.996	3.011	3.198	3.197	3.229	3.481	3.592	3.985	4.127	4.125
2.5	3.873	3.894	4.157	4.169	4.214	4.569	4.759	5.324	5.530	5.549
3.0	4.819	4.850	5.199	5.235	5.302	5.779	6.076	6.868	7.144	7.183
3.5	5.845	5.890	6.335	6.408	6.511	7.146	7.583	8.690	9.077	9.143
4.0	6.958	7.023	7.574	7.698	7.860	8.709	9.332	10.875	11.469	11.580
4.5	8.164	8.258	8.924	9.116	9.363	10.512	11.376	13.527	14.500	14.694
5.0	9.471	9.603	10.393	10.673	11.037	12.604	13.780	16.771	18.405	18.748
5.5	10.884	11.067	11.989	12.378	12.898	15.039	16.619	20.759	23.493	24.100
6.0	12.410	12.658	13.719	14.241	14.965	17.882	19.979	25.682	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\log \text{Kg GN}_2/\text{hr}) + c (\log \text{Kg GN}_2/\text{hr})^2 + d (\log \text{Kg GN}_2/\text{hr})^3 + e (\log \text{Kg GN}_2/\text{hr})^4$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°K)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	29.190	297.6	0.145693	1.099554	-0.098008	0.322142	-----	0.065
4.9	29.217	296.8	0.143724	1.128544	-0.169942	0.389166	-----	0.036
11.3	28.971	301.0	0.167434	1.119751	-0.096439	0.333083	-----	0.101
16.7	28.920	299.5	0.166075	1.120757	-0.096156	0.368398	-----	0.074
24.1	29.304	299.6	0.166160	1.160662	-0.225818	0.514615	-----	0.067
38.9	29.445	303.5	0.193537	1.127521	0.135895	-0.348465	0.718379	0.067
53.9	29.416	299.8	0.197734	1.149132	0.181647	-0.421566	0.810811	0.055
67.3	29.311	303.5	0.236378	1.158639	0.267813	-0.685100	1.179051	0.049
83.5	29.203	300.9	0.243634	1.119816	0.827164	-2.214470	2.474630	0.116
100.2	29.249	298.2	0.244428	1.054097	1.213296	-2.956009	2.967916	0.100

TABLE XLV Part B

TEST NO. 11

CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 020NOMINAL TEST SPECIMEN INLET PRESSURE = 29.177 Kg/cm²

FLOW RATE (liters GN ₂ /min)*	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
	0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2
10	0.995	0.978	1.030	1.036	1.020	1.134	1.129	1.247	1.322	1.403
15	1.525	1.517	1.598	1.603	1.607	1.702	1.721	1.889	1.926	1.917
20	2.065	2.063	2.180	2.187	2.203	2.348	2.397	2.641	2.706	2.691
25	2.626	2.629	2.788	2.800	2.823	3.038	3.125	3.459	3.566	3.564
30	3.212	3.220	3.426	3.447	3.478	3.766	3.902	4.340	4.487	4.497
35	3.829	3.841	4.101	4.134	4.175	4.535	4.732	5.293	5.481	5.493
40	4.478	4.496	4.814	4.865	4.920	5.356	5.626	6.336	6.570	6.577
45	5.163	5.188	5.570	5.643	5.716	6.239	6.599	7.493	7.789	7.790
50	5.884	5.919	6.369	6.472	6.569	7.198	7.664	8.787	9.175	9.179
55	6.645	6.691	7.215	7.353	7.483	8.247	8.838	10.247	10.774	10.802
60	7.446	7.506	8.109	8.289	8.462	9.402	10.139	11.906	12.641	12.727
65	8.289	8.367	9.054	9.283	9.509	10.679	11.587	13.801	14.838	15.041
70	9.176	9.274	10.051	10.337	10.627	12.096	13.204	15.974	17.443	17.846
75	10.108	10.231	11.102	11.454	11.822	13.673	15.013	18.474	20.548	21.275
80	11.086	11.238	12.208	12.636	13.097	15.434	17.043	21.357	24.266	25.492
85	12.113	12.298	13.373	13.885	14.456	17.403	19.323	24.688	28.733	-----
90	13.188	13.412	14.598	15.204	15.902	19.607	21.888	28.544	-----	-----
95	14.314	14.582	15.884	16.595	17.441	22.078	24.775	-----	-----	-----
100	15.493	15.810	17.234	18.062	19.075	24.852	28.028	-----	-----	-----

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

Log (Kg/cm² differential) = a + b (log liters GN₂/min) + c (log liters GN₂/min)² + d (log liters GN₂/min)³ + e (log liters GN₂/min)⁴TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°K)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	29.190	297.6	-1.412082	1.990013	-0.816113	0.235829	-----	0.059
4.9	29.217	296.8	-1.563501	2.281730	-1.005364	0.277552	-----	0.042
11.3	28.971	301.0	-1.464982	2.113227	-0.889267	0.253998	-----	0.106
16.7	28.920	299.5	-1.472521	2.158996	-0.945149	0.273986	-----	0.070
24.1	29.304	299.6	-1.783666	2.806602	-1.391466	0.377100	-----	0.052
38.9	29.445	303.5	2.576104	-9.429755	11.430694	-5.539606	1.017052	0.065
53.9	29.416	299.8	2.305676	-8.751939	10.795909	-5.276740	0.979755	0.062
67.3	29.311	303.5	3.480150	-12.130055	14.556821	-7.138782	1.327809	0.056
83.5	29.203	300.9	7.340883	-23.157747	26.294913	-12.648582	2.291846	0.127
100.2	29.249	298.2	11.906909	-35.889404	39.487559	-18.674366	3.316252	0.157

TABLE XLV Part C
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 020
 NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (lbs GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (PSID)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2	
1.0	7.897	7.471	8.138	8.097	7.457	9.977	10.117	11.674	17.070	21.857
1.5	12.910	12.630	13.447	13.404	13.063	14.580	14.650	16.117	17.559	18.675
2.0	17.870	17.728	18.738	18.681	18.599	19.908	20.059	21.925	22.436	22.660
2.5	22.832	22.799	24.059	23.986	24.094	25.613	25.936	28.403	28.841	28.720
3.0	27.850	27.900	29.464	29.383	29.622	31.567	32.135	35.312	36.045	35.817
3.5	32.964	33.080	34.995	34.922	35.255	37.733	38.607	42.570	43.746	43.537
4.0	38.209	38.377	40.687	40.640	41.045	44.113	45.351	50.173	51.824	51.701
4.5	43.607	43.822	46.566	46.568	47.040	50.729	52.392	58.156	60.263	60.256
5.0	49.181	49.440	52.655	52.731	53.276	57.615	59.766	66.577	69.107	69.227
5.5	54.945	55.252	58.972	59.151	59.786	64.812	67.519	75.511	78.445	78.691
6.0	60.915	61.275	65.534	65.847	66.597	72.362	75.704	85.039	88.387	88.760
6.5	67.103	67.527	72.354	72.835	73.736	80.313	84.375	95.255	99.070	99.572
7.0	73.521	74.021	79.446	80.132	81.226	88.712	93.592	106.257	110.645	111.290
7.5	80.179	80.770	86.822	87.753	89.091	97.610	103.415	118.151	123.280	124.095
8.0	87.087	87.788	94.495	95.711	97.352	107.059	113.912	131.054	137.165	138.194
8.5	94.254	95.086	102.475	104.022	106.031	117.114	125.150	145.091	152.509	153.815
9.0	101.690	102.676	110.773	112.698	115.150	127.831	137.204	160.396	169.548	171.221
9.5	109.403	110.569	119.400	121.752	124.730	139.272	150.152	177.118	188.544	190.707
10.0	117.402	118.776	128.367	131.200	134.792	151.501	164.077	195.419	209.798	212.607
10.5	125.695	127.308	137.683	141.053	145.358	164.584	179.068	215.474	233.648	237.308
11.0	134.291	136.177	147.360	151.325	156.450	178.593	195.220	237.478	260.478	265.250
11.5	143.197	145.393	157.408	162.031	168.090	193.604	212.636	261.645	290.728	296.942
12.0	152.424	154.967	167.838	173.182	180.301	209.697	231.426	288.208	324.903	332.971
12.5	161.977	164.910	178.659	184.794	193.106	226.961	251.706	317.427	363.578	374.017
13.0	171.867	175.233	189.882	196.880	206.529	245.485	273.605	349.586	407.417	-----
13.5	182.102	185.948	201.518	209.455	220.593	265.369	297.259	385.000	-----	-----
14.0	192.689	197.065	213.577	222.531	235.324	286.718	322.816	-----	-----	-----
14.5	203.638	208.596	226.071	236.125	250.747	309.644	350.433	-----	-----	-----
15.0	214.956	220.552	239.011	250.250	266.887	334.268	380.283	-----	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{LOG (PSID)} = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			<u>a</u>	<u>b</u>	<u>c</u>	<u>d</u>	<u>e</u>	
0.0	415.2	76.0	0.897436	1.277286	-0.425329	0.320281	-----	0.929
4.9	415.6	74.5	0.873360	1.383621	-0.572194	0.389941	-----	0.508
11.3	412.1	82.1	0.910531	1.306138	-0.442554	0.334337	-----	1.444
16.7	411.3	79.4	0.908342	1.314791	-0.471546	0.366346	-----	1.060
24.1	416.8	79.6	0.872592	1.500244	-0.759105	0.515933	-----	0.943
38.9	418.8	86.6	0.999020	0.796623	1.001527	-1.336519	0.719764	0.959
53.9	418.4	79.9	1.005050	0.747466	1.185546	-1.533961	0.810947	0.784
67.3	416.9	86.7	1.067227	0.542729	1.802958	-2.298742	1.176794	0.692
83.5	415.4	81.9	1.232237	-0.621876	4.835068	-5.590354	2.466727	1.638
100.2	416.0	77.1	1.339587	-1.306387	6.362640	-7.039601	2.971339	1.431

TABLE XLV Part D
TEST NO. 11
CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 020
NOMINAL TEST SPECIMEN INLET PRESSURE = 415 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2	
0.4	15.265	15.056	15.951	15.898	15.686	17.043	17.123	18.754	19.635	20.182
0.5	19.563	19.461	20.547	20.483	20.473	21.818	22.028	24.072	24.498	24.565
0.6	23.878	23.863	25.180	25.107	25.247	26.835	27.223	29.810	30.279	30.127
0.7	28.242	28.296	29.883	29.808	30.058	32.032	32.640	35.854	36.609	36.380
0.8	32.682	32.793	34.685	34.618	34.949	37.389	38.258	42.159	43.307	43.086
0.9	37.219	37.377	39.606	39.562	39.958	42.906	44.079	48.724	50.294	50.130
1.0	41.870	42.069	44.666	44.661	45.115	48.597	50.119	55.570	57.549	57.471
1.1	46.648	46.887	49.879	49.931	50.445	54.482	56.401	62.731	65.094	65.114
1.2	51.565	51.844	55.258	55.387	55.970	60.587	62.954	70.252	72.974	73.099
1.3	56.631	56.954	60.814	61.044	61.710	66.938	69.810	78.184	81.256	81.489
1.4	61.854	62.228	66.558	66.911	67.683	73.565	77.005	86.585	90.018	90.363
1.5	67.244	67.674	72.498	73.002	73.906	80.499	84.574	95.515	99.351	99.815
1.6	72.807	73.304	78.644	79.325	80.394	87.772	92.557	105.038	109.356	109.953
1.7	78.551	79.126	85.003	85.890	87.163	95.415	100.993	115.226	120.144	120.895
1.8	84.481	85.147	91.584	92.708	94.226	103.465	109.924	126.151	131.837	132.773
1.9	90.604	91.377	98.393	99.788	101.599	111.956	119.396	137.894	144.567	145.732
2.0	96.926	97.821	105.438	107.137	109.295	120.925	129.453	150.540	158.482	159.934
2.1	103.453	104.489	112.727	114.766	117.328	130.411	140.146	164.181	173.746	175.558
2.2	110.190	111.387	120.265	122.683	125.712	140.454	151.525	178.916	190.538	192.805
2.3	117.144	118.522	128.060	130.896	134.462	151.097	163.646	194.851	209.059	211.900
2.4	124.319	125.901	136.120	139.416	143.592	162.383	176.566	212.104	229.533	233.096
2.5	131.721	133.533	144.449	148.250	153.115	174.361	190.346	230.799	252.213	256.677
2.6	139.356	141.423	153.056	157.407	163.047	187.079	205.051	251.072	277.379	282.965
2.7	147.228	149.579	161.948	166.896	173.402	200.590	220.751	273.071	305.349	312.325
2.8	155.345	158.008	171.130	176.726	184.196	214.949	237.518	296.957	336.479	345.171
2.9	163.709	166.717	180.611	186.907	195.443	230.213	255.432	322.906	371.172	381.973
3.0	172.329	175.713	190.396	197.447	207.159	246.446	274.575	351.107	409.881	-----
3.1	181.208	185.004	200.493	208.355	219.361	263.712	295.036	381.768	-----	-----
3.2	190.352	194.597	210.910	219.642	232.063	282.081	316.911	-----	-----	-----
3.3	199.767	204.499	221.652	231.315	245.284	301.627	340.299	-----	-----	-----
3.4	209.459	214.718	232.727	243.386	259.039	322.427	365.310	-----	-----	-----
3.5	219.432	225.261	244.142	255.864	273.346	344.566	392.057	-----	-----	-----

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\text{log SCRM}) + c (\text{log SCFM})^2 + d (\text{log SCFM})^3 + e (\text{log SCFM})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	415.2	76.0	1.621903	1.125428	0.188038	0.319323	-----	0.932
4.9	415.6	74.5	1.623964	1.129680	0.174783	0.387222	-----	0.514
11.3	412.1	82.1	1.649978	1.149395	0.197486	0.334420	-----	1.438
16.7	411.3	79.4	1.649925	1.160229	0.228911	0.366846	-----	1.069
24.1	416.8	79.6	1.654319	1.161303	0.227025	0.517629	-----	0.954
38.9	418.8	86.6	1.686609	1.190245	0.199111	0.496878	0.731871	0.957
53.9	418.4	79.9	1.699999	1.228355	0.232890	0.542265	0.784871	0.772
67.3	416.9	86.7	1.744838	1.259015	0.276774	0.699140	1.176255	0.702
83.5	415.4	81.9	1.760040	1.284840	0.152460	0.683694	2.520705	1.655
100.2	416.0	77.1	1.759447	1.302909	0.146386	0.535207	2.972947	1.411

TABLE XLVI Part A
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 020
 NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

FLOW RATE (Kg GN ₂ /hr)	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
	0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2
0.5	0.286	0.280	0.264	0.278	0.282	0.285	0.287	0.298	0.311	0.322
1.0	0.582	0.571	0.559	0.570	0.581	0.595	0.593	0.627	0.647	0.675
1.5	0.898	0.882	0.873	0.881	0.903	0.930	0.926	0.991	1.022	1.073
2.0	1.230	1.208	1.203	1.211	1.245	1.287	1.285	1.386	1.434	1.513
2.5	1.578	1.547	1.546	1.556	1.605	1.663	1.667	1.808	1.880	1.990
3.0	1.939	1.900	1.900	1.915	1.981	2.057	2.069	2.255	2.356	2.503
3.5	2.313	2.263	2.264	2.287	2.372	2.466	2.491	2.725	2.862	3.049
4.0	2.698	2.638	2.637	2.672	2.777	2.890	2.932	3.217	3.395	3.627
4.5	3.095	3.022	3.018	3.067	3.195	3.328	3.389	3.730	3.956	4.236
5.0	3.503	3.416	3.407	3.474	3.625	3.779	3.864	4.263	4.543	4.875
5.5	3.920	3.819	3.803	3.891	4.067	4.242	4.354	4.815	5.155	5.543
6.0	4.348	4.230	4.206	4.318	4.521	4.718	4.860	5.386	5.792	6.239

NOTE: Data values obtained from least square equation of experimental data in the form: ,

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log Kg GN}_2/\text{hr}) + c (\text{log Kg GN}_2/\text{hr})^2 + d (\text{log Kg GN}_2/\text{hr})^3 + e (\text{log Kg GN}_2/\text{hr})^4$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°K)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	68.050	301.9	-0.234785	1.051610	0.090361	-----	-----	0.006
4.9	69.750	299.3	-0.243030	1.055540	0.079310	-----	-----	0.005
11.3	70.461	298.1	-0.252731	1.093923	0.041813	-----	-----	0.014
16.7	69.708	295.0	-0.244481	1.061413	0.088911	-----	-----	0.013
24.1	70.321	299.4	-0.236186	1.072357	0.094065	-----	-----	0.010
38.9	70.043	300.4	-0.225827	1.088116	0.087287	-----	-----	0.014
53.9	70.865	295.2	-0.227238	1.080954	0.120127	-----	-----	0.012
67.3	70.698	300.2	-0.202868	1.109803	0.116467	-----	-----	0.020
83.5	71.283	297.1	-0.189414	1.102934	0.155216	-----	-----	0.019
100.2	71.297	300.1	-0.170778	1.116276	0.160672	-----	-----	0.020

TABLE XLVI Part B
TEST NO. 11CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 020NOMINAL TEST SPECIMEN INLET PRESSURE = 70.307 Kg/cm²

FLOW RATE (liters GN ₂ /min)*	NET DIFFERENTIAL PRESSURE (Kg/cm ² DIFFERENTIAL)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2	
10	0.421	0.409	0.403	0.409	0.417	0.422	0.423	0.440	0.456	0.478
15	0.634	0.619	0.613	0.619	0.633	0.646	0.645	0.682	0.701	0.738
20	0.854	0.836	0.831	0.837	0.858	0.880	0.879	0.939	0.965	1.018
25	1.081	1.060	1.055	1.062	1.092	1.125	1.125	1.209	1.245	1.317
30	1.315	1.290	1.286	1.295	1.335	1.378	1.381	1.492	1.540	1.633
35	1.556	1.526	1.522	1.534	1.585	1.640	1.647	1.787	1.850	1.966
40	1.803	1.767	1.764	1.779	1.842	1.909	1.922	2.093	2.174	2.314
45	2.056	2.014	2.010	2.031	2.105	2.185	2.206	2.409	2.512	2.677
50	2.314	2.265	2.261	2.288	2.375	2.468	2.499	2.735	2.863	3.056
55	2.578	2.521	2.517	2.551	2.651	2.758	2.799	3.070	3.226	3.448
60	2.847	2.781	2.776	2.818	2.934	3.054	3.108	3.415	3.602	3.854
65	3.120	3.046	3.040	3.091	3.221	3.356	3.424	3.768	3.990	4.274
70	3.399	3.314	3.307	3.369	3.515	3.664	3.748	4.130	4.389	4.706
75	3.682	3.587	3.578	3.651	3.813	3.978	4.078	4.500	4.800	5.152
80	3.970	3.864	3.853	3.938	4.117	4.297	4.416	4.879	5.222	5.610
85	4.262	4.144	4.131	4.229	4.425	4.621	4.761	5.265	5.655	6.080
90	4.558	4.428	4.412	4.524	4.739	4.950	5.112	5.659	6.098	6.563
95	4.859	4.715	4.697	4.824	5.057	5.285	5.470	6.060	6.553	7.058
100	5.163	5.006	4.984	5.128	5.380	5.624	5.834	6.469	7.017	7.564

*At 21.1°C (70°F) and 1.033 Kg/cm² (14.7 psia)

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (Kg/cm}^2 \text{ differential)} = a + b (\text{log liters GN}_2/\text{min}) + c (\text{log liters GN}_2/\text{min})^2 + d (\text{log liters GN}_2/\text{min})^3 + e (\text{log liters GN}_2/\text{min})^2$$

TOTAL QUANTITY
OF

SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (Kg/cm ²)	AVG. TEST SPECIMEN INLET TEMPERATURE (°K)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	68.050	301.9	-1.264332	0.789478	0.099574	-----	-----	0.006
4.9	69.750	299.3	-1.312439	0.843088	0.081441	-----	-----	0.006
11.3	70.461	298.1	-1.352331	0.889262	0.067854	-----	-----	0.015
16.7	69.708	295.0	-1.296938	0.814086	0.094678	-----	-----	0.012
24.1	70.321	299.4	-1.295594	0.817375	0.097910	-----	-----	0.013
38.9	70.043	300.4	-1.320316	0.855212	0.089988	-----	-----	0.014
53.9	70.865	295.2	-1.275048	0.781892	0.119301	-----	-----	0.014
67.3	70.698	300.2	-1.308814	0.845249	0.107280	-----	-----	0.020
83.5	71.283	297.1	-1.223663	0.730533	0.152194	-----	-----	0.023
100.2	71.297	300.1	-1.209192	0.733448	0.155265	-----	-----	0.022

TABLE XLVI Part C
TEST NO. 11
CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
TEST SPECIMEN S/N 020
NOMINAL TEST SPECIMEN INLET PRESSURE = 1.000 PSIA

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\log (PSID) = a + b (\log \text{lbs GN}_2/\text{hr}) + c (\log \text{lbs GN}_2/\text{hr})^2 + d (\log \text{lbs GN}_2/\text{hr})^3 + e (\log \text{lbs GN}_2/\text{hr})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	967.9	83.7	0.567535	0.990176	0.090048	-----	-----	0.089
4.9	992.1	79.1	0.557415	0.999920	0.079977	-----	-----	0.073
11.3	1002.2	77.0	0.545938	1.024280	0.066177	-----	-----	0.183
16.7	991.5	71.4	0.553991	1.001935	0.087926	-----	-----	0.183
24.1	1000.2	79.2	0.559837	1.007692	0.094022	-----	-----	0.147
38.9	996.2	80.9	0.563674	1.028605	0.087045	-----	-----	0.201
53.9	1007.9	71.8	0.568530	0.999010	0.119836	-----	-----	0.168
67.3	1005.6	80.6	0.582699	1.030071	0.116350	-----	-----	0.288
83.5	1013.9	75.1	0.603032	0.996845	0.154908	-----	-----	0.267
100.2	1014.1	80.5	0.618068	1.005710	0.160748	-----	-----	0.293

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TABLE XLVI Part D
 TEST NO. 11
 CONTAMINATED CONDITION - FLOW RATE VERSUS DIFFERENTIAL PRESSURE
 TEST SPECIMEN S/N 020
 NOMINAL TEST SPECIMEN INLET PRESSURE = 1,000 PSIA

FLOW RATE (SCFM)	NET DIFFERENTIAL PRESSURE (PSID)									
	TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)									
0.0	4.9	11.3	16.7	24.1	38.9	53.9	67.3	83.5	100.2	
0.4	6.451	6.332	6.238	6.297	6.401	6.533	6.529	6.861	7.088	7.383
0.5	8.142	7.998	7.908	7.963	8.116	8.312	8.287	8.764	9.035	9.434
0.6	9.877	9.704	9.619	9.675	9.882	10.148	10.107	10.745	11.070	11.585
0.7	11.652	11.448	11.369	11.429	11.696	12.037	11.988	12.798	13.190	13.833
0.8	13.465	13.228	13.155	13.224	13.556	13.975	13.924	14.920	15.391	16.173
0.9	15.315	15.041	14.974	15.055	15.458	15.960	15.915	17.108	17.671	18.602
1.0	17.200	16.886	16.824	16.923	17.402	17.988	17.959	19.359	20.026	21.117
1.1	19.117	18.762	18.704	18.826	19.384	20.059	20.052	21.669	22.455	23.715
1.2	21.067	20.667	20.613	20.761	21.404	22.171	22.193	24.038	24.955	26.394
1.3	23.048	22.601	22.549	22.729	23.460	24.321	24.381	26.463	27.525	29.152
1.4	25.059	24.561	24.511	24.727	25.552	26.508	26.615	28.942	30.162	31.988
1.5	27.098	26.548	26.499	26.755	27.677	28.732	28.893	31.475	32.866	34.899
1.6	29.165	28.561	28.511	28.812	29.835	30.991	31.214	34.058	35.635	37.885
1.7	31.260	30.598	30.546	30.897	32.024	33.283	33.577	36.693	38.467	40.943
1.8	33.381	32.659	32.604	33.009	34.245	35.609	35.981	39.376	41.362	44.073
1.9	35.527	34.743	34.684	35.148	36.496	37.967	38.426	42.107	44.318	47.274
2.0	37.699	36.850	36.785	37.313	38.777	40.356	40.909	44.885	47.335	50.544
2.1	39.896	38.979	38.908	39.503	41.086	42.775	43.432	47.709	50.412	53.882
2.2	42.116	41.130	41.050	41.718	43.424	45.225	45.992	50.579	53.547	57.288
2.3	44.361	43.302	43.213	43.957	45.790	47.704	48.589	53.493	56.740	60.761
2.4	46.628	45.495	45.395	46.220	48.182	50.212	51.224	56.450	59.991	64.299
2.5	48.918	47.708	47.596	48.507	50.601	52.747	53.894	59.451	63.298	67.902
2.6	51.230	49.941	49.816	50.816	53.046	55.311	56.599	62.494	66.660	71.570
2.7	53.564	52.194	52.054	53.148	55.517	57.901	59.340	65.578	70.078	75.302
2.8	55.919	54.466	54.309	55.501	58.013	60.518	62.115	68.704	73.551	79.097
2.9	58.295	56.757	56.582	57.877	60.534	63.161	64.925	71.870	77.078	82.954
3.0	60.693	59.066	58.873	60.274	63.080	65.830	67.768	75.077	80.658	86.873
3.1	63.110	61.393	61.180	62.692	65.649	68.524	70.644	78.323	84.292	90.854
3.2	65.548	63.739	63.503	65.131	68.242	71.243	73.552	81.608	87.977	94.895
3.3	68.005	66.102	65.843	67.590	70.889	73.987	76.493	84.931	91.715	98.997
3.4	70.483	68.482	68.199	70.069	73.499	76.755	79.467	88.293	95.505	103.159
3.5	72.979	70.880	70.571	72.568	76.161	79.547	82.471	91.692	99.346	107.380

NOTE: Data values obtained from least square equation of experimental data in the form:

$$\text{Log (PSID)} = a + b (\log \text{SCFM}) + c (\log \text{SCFM})^2 + d (\log \text{SCFM})^3 + e (\log \text{SCFM})^4$$

TOTAL QUANTITY OF SYNTHETIC CONTAMINANT ADDED (mg)	AVG. TEST SPECIMEN INLET PRESSURE (PSIA)	AVG. TEST SPECIMEN INLET TEMPERATURE (°F)	EQUATION COEFFICIENTS					SIGMA
			a	b	c	d	e	
0.0	967.9	83.7	1.235518	1.105521	0.088513	-----	-----	0.088
4.9	992.1	79.1	1.227533	1.101979	0.079187	-----	-----	0.069
11.3	1002.2	77.0	1.225931	1.108886	0.065494	-----	-----	0.182
16.7	991.5	71.4	1.228486	1.114101	0.088215	-----	-----	0.186
24.1	1000.2	79.2	1.240587	1.128190	0.092337	-----	-----	0.148
38.9	996.2	80.9	1.254993	1.139738	0.086261	-----	-----	0.201
53.9	1007.9	71.8	1.254271	1.151759	0.119581	-----	-----	0.168
67.3	1005.6	80.6	1.286873	1.178286	0.116179	-----	-----	0.287
83.5	1013.9	75.1	1.301598	1.194694	0.153908	-----	-----	0.272
100.2	1014.1	80.5	1.324622	1.210830	0.160562	-----	-----	0.295